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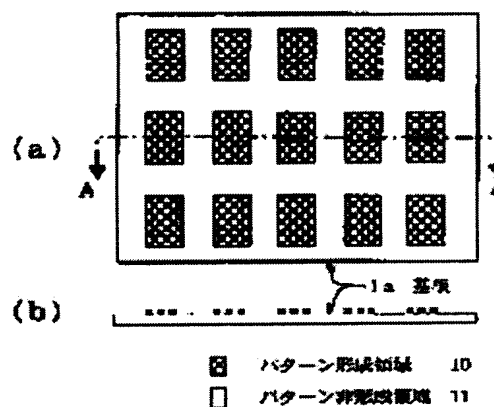
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(54) SUBSTRATE FOR FORMING SPECIFIED PATTERN AND PRODUCTION THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a substrate in which an appropriate quantity of fluid material can be applied to a pattern forming region of predetermined area.

SOLUTION: A substrate 1a for forming a patterned film by applying a specified fluid material has a specifically patterned pattern forming region 10 for forming a film. In the pattern forming region 10, regions exhibiting affinity to the fluid material are arranged between regions exhibiting no affinity to the fluid material according to a specified rule. Consequently, a uniform thin film can be formed by applying the fluid material uniformly to required regions without over spreading or breaking it.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to deformation of a universal substrate, and relates to amelioration of the substrate suitable for making a liquid phase ingredient adhere by the fixed pattern especially.

[0002]

[Description of the Prior Art] Conventionally, there were a universal substrate or an omnipotent substrate, and a substrate called. This substrate has arranged regularly the punctate copper film field where solder tends to adhere. In this universal substrate, it becomes possible to fix components to the location of the arbitration on a substrate with solder etc. Between each part articles, to the copper film field, continuously, piled solder, and it wired and had connected with other components through lead wire with the soldering iron.

[0003]

[Problem(s) to be Solved by the Invention] By the way, in order to form a thin film in the configuration of a pattern of having a fixed area, a certain amount of quantity of a fluid must be made for the whole pattern formation field to adhere to homogeneity. However, the above-mentioned universal substrate had not turned to such an application.

[0004] For this reason, it needed to be made for a fluid not to flow out of a pattern space, though it was natural in order to make the fluid of such a constant rate adhere to the pattern formation field of fixed area until it formed the bank (batch member) and solidified along with the periphery of a pattern formation field so that a fluid might not flow out of a pattern formation field. However, there was un-arranging [much] that it was as that concordance and the ingredient of a cone bank must be chosen as the both sides of a substrate side and a fluid **** [, and]. [that it takes the time and effort of bank formation by the thin film formation approach which forms a bank] [that boom hoisting arises superfluously on a substrate front face for a bank]

[0005] In order to solve this un-arranging, the invention-in-this-application person hit on an idea to the formation approach of a specific pattern with possible making a certain amount of quantity of a fluid adhere to homogeneity, without using a batch member etc. into the pattern space of a fixed configuration.

[0006]

[Means for Solving the Problem] That is, the 1st technical problem of this invention is providing the pattern formation field of fixed area with the substrate which enables optimum dose adhesion of a fluid by arranging regularly the field which is affinitive to a fluid, and a field without compatibility.

[0007] The 2nd technical problem of this invention is providing the pattern formation field of fixed area with the manufacture approach of the substrate which enables optimum dose adhesion of a fluid by arranging regularly the field which is affinitive to a fluid, and a field without compatibility.

[0008] Invention which solves the 1st technical problem of the above is a substrate for forming the film which the predetermined fluid was made to adhere and was patternized, and in order to form the film, it

is equipped with the pattern formation field patternized by the specific configuration. And a pattern formation field is a substrate for specific pattern formation characterized by arranging and constituting the compatibility field which is affinitive to a fluid according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned. For example, a pattern formation field is arranged under a fixed regulation, and, as for this substrate, are constituted. [two or more] Or the pattern formation field is formed and constituted by the fixed graphic form configuration. [0009] A "fluid" is a medium which could use not only for ink but for industrial use, and was equipped with the viscosity in which the regurgitation is possible from the nozzle here. ** which is oiliness as it is aquosity is not asked. Moreover, mixture may be mixed in colloid. Moreover, it says that a contact angle [as opposed to a fluid with "it is affinitive"] is relatively small, and the thing with a relatively large contact angle for which a fluid is received, saying "there is no compatibility" is said. This the expression of both is used for convenience, in order to clarify behavior of the film to a fluid. The array of the above "a compatibility field" or a "non-compatibility field" is arranged so that patterns of arbitration, such as a dispersion pattern, a mosaic pattern, and a striped pattern, may be formed. The configuration of each field may be circular or the polygon or line of a triangle, a square, etc. is sufficient as it. Each area size is not restricted, either.

[0010] The process which invention which solves the 2nd technical problem of the above is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized, and applies paraffin and forms a paraffin layer on a pedestal, b) So that the compatibility field which has compatibility to a fluid in the pattern formation field which forms the patternized film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned It is the manufacture approach of the substrate characterized by having the process which supplies energy along the compatibility field concerned and removes the paraffin layer of the compatibility field concerned.

[0011] Moreover, the process which other invention which solves the 2nd technical problem of the above is the manufacture approaches of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized, and forms a metal layer with a predetermined metal on a pedestal, b) The process which supplies energy to fields other than the pattern formation field which forms the patternized film, and removes a metal layer, c) The process which supplies energy along the non-compatibility field concerned, and removes the metal layer of the non-compatibility field concerned so that the compatibility field which has compatibility to a fluid in a pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, d) It is the manufacture approach of the substrate characterized by having the process to which a metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[0012] As for the above-mentioned sulfur compound, it is desirable to have a property opposite to a pedestal front face about the compatibility over a fluid here.

[0013] Other invention which furthermore solves the 2nd technical problem of the above It is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized. a) Cover fields other than the pattern formation field which forms the patternized film, and it sets to the pattern formation field concerned. The process which carries out the mask of the non-compatibility field concerned with a wrap mesh mask so that the compatibility field which is affinitive to a fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, b) It is the manufacture approach of the substrate characterized by having the process which carries out plasma etching of the pedestal to which the mesh mask was carried out, and the process which carries out reforming processing of the molecule which produced dissociation by c plasma etching.

[0014] Other invention which solves the 2nd technical problem of the above further again It is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized. a) Cover fields other than the pattern formation field which forms the patternized film, and it sets to the pattern formation field concerned. The process which carries out the

mask of the non-compatibility field concerned with a wrap mesh mask so that the compatibility field which is affinitive to a fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, b) It is the manufacture approach of the substrate characterized by equipping the pedestal to which the mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[0015] Other invention which furthermore solves the 2nd technical problem of the above The process which forms a thin film with the ingredient which has compatibility to a fluid on the pedestal which is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized, and was equipped with the front face which does not have compatibility to a fluid, b) The process which prepares a wrap photoresist for the compatibility field concerned so that the compatibility field which is affinitive to a fluid in the pattern formation field which forms the patternized film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, c) It is the manufacture approach of the substrate characterized by having the process which etches fields other than the field in which the pedestal in which the photoresist was formed was etched into and the photoresist was prepared.

[0016] The process which invention which furthermore solves the 2nd technical problem of the above is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized, and gives a charge all over a pedestal, b) The process which energy is given [process] to fields other than the pattern formation field which forms the patternized film, and extinguishes a charge, c) The process which extinguishes the charge of the non-compatibility field concerned so that the compatibility field which is affinitive to a fluid in a pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, d) It is the manufacture approach of a substrate equipped with the process which combines the predetermined matter with the compatibility field to which a charge did not disappear.

[0017] Invention which furthermore solves the 2nd technical problem of the above is the manufacture approach of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized. So that the compatibility field which is affinitive to a fluid in the pattern formation field which forms the patternized film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned It is the manufacture approach of the substrate characterized by having the process which forms the compatibility film in the compatibility field concerned.

[0018] In order to form the film patternized with the fluid to the above-mentioned substrate here, being based on an ink jet method is desirable. The fluid which serves as a membranous ingredient to the cavity constituted possible [restoration of the fluid of an ink jet type recording head] first is supplied. And making the cavity concerned produce a volume change impresses an electrical potential difference to the piezo electric crystal component constituted possible, and the drop of a fluid is made to breathe out from the nozzle so that a fluid may adhere uniformly all over a pattern formation field.

[0019]

[Embodiment of the Invention] Hereafter, the gestalt for carrying out this invention is explained with reference to a drawing.

(Operation gestalt 1) The operation gestalt 1 of this invention is related with the substrate structure of being suitable for formation of a specific pattern. Outline drawing of the substrate of this operation gestalt 1 is shown in drawing 1. Drawing 1 (a) is a top view and drawing 1 (b) is drawing which looked at drawing 1 (a) from the cutting plane AA. As shown in drawing 1 (a), the pattern formation field 10 is patternized by the pattern formation side of a pedestal between the pattern agensis fields 11, and substrate 1a of this operation gestalt 1 is arranged in it. The pattern formation field 10 is a field for making a predetermined fluid adhere and making a thin film form. The pattern agensis field 11 is a field in which said thin film is not made to form. The pattern agensis field 11 turns into a field where the pedestal front face itself appears, when the pedestal is formed with the ingredient in which non-

compatibility is shown to a fluid.

[0020] Moreover, the non-compatibility field 111 which shows non-compatibility to the compatibility field 110 and fluid in which compatibility is shown to a fluid is arranged by turns, and the pattern formation field 10 is constituted. It is because a moderate quantity of a fluid can be made to adhere by arranging the compatibility field 110 and the non-compatibility field 111 by turns. However, the whole pattern formation field may consist of only compatibility fields 110.

[0021] The compatibility field 110 can use the pattern with which the rectangular field has touched mutually, and the pattern with which the rectangular field is arranged at fixed spacing like drawing 2 (b) like drawing 2 (a). Moreover, the pattern arranged at spacing with a fixed circular field can also be used like drawing 2 (c) like the pattern with which the circular field has touched mutually, and drawing 2 (d). As furthermore shown in drawing 2 (e), the pattern arranged at spacing with a fixed triangle field can also be used like the pattern with which the triangle field has touched mutually, and drawing 2 (f). Furthermore, the pattern which consists of parallel lines like drawing 2 (g) can be considered. A polygon, an irregular configuration, etc. of such other arbitration can be used.

[0022] It is decided whether compatibility will be shown here or non-compatibility will be shown by with what kind of property the fluid which is a pattern formation object is equipped. For example, if a fluid contains a polar molecule like water, the surface field equipped with the polar group shows compatibility, and the surface field which is not equipped with a polar group shows non-compatibility. Conversely, if a fluid does not contain a polar molecule like many organic media, the surface field equipped with the polar group shows non-compatibility, and the surface field which is not equipped with a polar group shows compatibility. It is set by with what kind of ingredient as what a fluid is used forms a thin film. With this operation gestalt, the ingredient of a pedestal is defined so that the pattern agensis field 11 may show non-compatibility to a fluid. The non-compatibility field 111 of the pattern formation field 10 is a part which the front face of a pedestal has exposed like the pattern agensis field 11.

[0023] The example of an ingredient usable as the pattern agensis field 11 and the non-compatibility field 111 of this operation gestalt and an ingredient usable as a compatibility field 110 is shown in Table 1.

[0024]

[Table 1]

構成要素	流動体が極性分子 含む場合	流動体が極性分 子含まない場合
パターン非形 成領域 11、 非親和性領域 111	ペークライト、ポリ エステル、ポリ エチレン、テフロ ン、PMMA、ポリ プロピレン、塩 化ビニル	ポリビニルアル コール、ポリアク リル酸、ナイロ ン、ガラス
親和性領域 110	OH 基を持つ硫黄化 合物膜、OH、C OOH、NH ₂ 基 等を持つシランカ ップリング剤	アルキル基等を 持つ硫黄酸化 物、有機化合物膜 (パラフィン 等)

[0025] The configuration of the pattern formation field 10, arrangement, magnitude, etc. can be set as arbitration according to an application. The pattern formation field 10 shown in drawing 1 (a) is carrying out the rectangle, and is arranged regularly. Of course, as a configuration of a pattern formation field, the polygon and the circular and irregular appearance other than a rectangle may be carried out. Moreover, as shown in drawing 3, the pattern formation field 10 may be formed in the graphic form of an alphabetic character, a notation, and others. A fluid is made to adhere to configurations, such as an alphabetic character and a notation, and it can use to thin-film-ize it. Moreover, arrangement of a pattern formation field does not need to be regular and may be irregular. enlarging or contracting is possible for especially pattern formation area size to versatility, without preparing a limit.

[0026] (Operation) The situation of the drop adhesion at the time of making a fluid adhere to drawing 5 and drawing 6 to the conventional substrate is shown. Drawing 5 (a) is a sectional view at the time of breathing out two or more drops of drops 12 to a pedestal 100, and drawing 6 (a) is the top view. If the regurgitation of the drop 12 is continued and carried out to the substrate which does not form the pattern formation field like this operation gestalt, the drop which reached the target like drawing 5 (a) will spread with surface tension, and the adjoining drop 12 will connect. Since anything does not have the boundary which prevents the breadth of a drop 12 at this time, as shown in drawing 6 (a), it will spread exceeding breadth when the profile of each drop reaches the target. When there are few solvent components of a fluid, since it solidifies with this profile spread, it becomes difficult to form a detailed pattern. When there are many solvent components, if a drop is dried, the solvent component in a drop will be removed, and each drop is contracted in the location which reached the target. Since there is no limit in an adhesion location, as shown in drawing 5 (b) and drawing 6 (b), the drop 12 connected at first is separated and it is set to island 12b. At it being set to island 12b and dissociating, it is ***** to a role as a pattern.

[0027] With reference to drawing 4, an operation of substrate 1a in the pattern formation field 10 of this operation gestalt is explained. Drawing 4 (a) shows the form of the drop on the substrate at the time of making the drop of a fluid adhere to the pattern of drawing 2 (a). Drawing 4 (b) shows the form of the drop on the substrate at the time of making the drop of a fluid adhere to the pattern of drawing 2 (g). The drop was made to adhere along Rhine L3 with an ink jet method in any case of the pattern in drawing 4 (a) and (b).

[0028] As shown in drawing 4 (a), the drop 12 which reached the target on the substrate fully spreads in the compatibility field 110. However, from the non-compatibility field 111, it is eliminated and is drawn in the compatibility field 110 which adjoins according to surface tension. Therefore, after surface tension works and is drawn, as shown in drawing 4 (a), a drop 12 adheres only to the compatibility field 110. Even if the discharge direction of the drop from a head shifts somewhat, whenever it reaches the fixed width of face from Rhine L2 to L4, the adhering drop 12 will ride on the compatibility field 110 between L4 from Rhine L2. Since it has dissociated mutually or the compatibility field 110 has only touched by one point, unless it reaches the target directly, it does not trespass upon the compatibility field 110 to which the drop 12 which rode on one compatibility field 110 adjoins. Since it is carrying out whether the compatibility field 110 where the drop 12 has surely ridden has touched, or it is slightly separated, drop 12 comrades are mutually connected next to the compatibility field 110 where the drop 12 has ridden with surface tension. Therefore, it is connected along with the locus which the drop 12 reached, and a pattern continues. Since it is in the condition that the drop was filled with the compatibility field 110 in which the drop 12 rode, it does not dissociate with the adjoining drop connected even if this drop dried.

[0029] As mentioned above, in the pattern formation field 10 formed like this operation gestalt, although a fluid fully spreads, in the field to which the fluid was made to adhere, it does not spread more than it, so that it may understand. That is, the fluid of optimum dose can be made to adhere. Pattern arrangement of the compatibility field 110 has desirable extent each pattern carries out [extent] point contact mutually. It is because there is a possibility that inhibition of the surface tension in a compatibility field boundary cannot be performed, but a drop may trespass upon an adjoining compatibility field without any restriction when each pattern contacts and it is connected completely. Conversely, it is because the continuity of a drop will be checked and separation of a drop pattern will be caused, if a punctiform pattern separates too much.

[0030] on the other hand -- the line of drawing 4 (b) -- by the pattern, the drop 12 has reached the target along Rhine L3, and it connects with the adjoining drop 12. this line -- by the pattern, as long as a drop 12 reaches the target among L4 from Rhine L2, it is absorbed by relation of the drop which carries out the core of Rhine L3, and a drop does not spread from the width of face of L4 from Rhine L2. Moreover, a drop pattern is not divided, as long as a drop 12 reaches the target so that it may overlap since Rhine L3 is continuing.

[0031] When forming a pattern using the substrate 1 of this operation gestalt, all the methods of making

a fluid adhere to a substrate side can be applied. For example, it is made to adhere by the ink jet method, and also various kinds of applying methods, such as a spin coat, a roll coat, a die coat, and a spray code, are applicable. It does not adhere to the pattern agenesis field 11, and a fluid can be made according to the substrate of this operation gestalt, to adhere, although a fluid adheres to the pattern formation field 10 uniformly since the fluid of moderate volume is constituted possible [adhesion] as it is a pattern. If a fluid is made to adhere, by performing heat treatment etc., evaporating a solvent and making it thin-film-ize from a fluid, a thin film can be formed as a pattern formation field.

[0032] As described above, since the fluid of optimum dose can be made to adhere to a pattern formation field and a fluid does not adhere to the other pattern agenesis field, according to this operation gestalt 1, a thin film can be formed as a pattern formation field.

[0033] (Operation gestalt 2) The operation gestalt 2 of this invention is related with the manufacture approach of the substrate explained with the above-mentioned operation gestalt 1 which used organic substances, such as paraffin. The manufacture approach of this operation gestalt is explained with reference to drawing 7 . Drawing 7 is the production process sectional view of the substrate of this invention.

[0034] Paraffin layer formation process (drawing 7 (a)) : A paraffin layer formation process is a process which applies paraffin to a pedestal 100 and forms the paraffin layer 101. A pedestal 100 chooses whether according to a fluid, it is made a hydrophilic property to a fluid, or it is made a non-hydrophilic property (hydrophobicity, oleophilic). A pedestal 100 is made into a hydrophilic property when a fluid does not contain a polar molecule. A pedestal 100 is chosen as a hydrophobic ingredient when a fluid contains a polar molecule. In drawing 7 , pattern formation in case a fluid does not contain a polar molecule is shown, and the thing of a hydrophilic property is used as a pedestal 100. For example, Pori 4-vinyl pyrrolidone, polyethylene oxide, polyvinyl alcohol, a cellulose, polyvinyl acetate, etc. are used for a pedestal 100. Approaches, such as the various applying methods, such as the roll coat method, a spin coat method, a spray coating method, the die coat method, and the bar coat method, various print processes, and a replica method, are applicable to formation of the paraffin layer 101.

[0035] Energy supply process (drawing 7 (b)) : A mask formation process is a process which energy is supplied [process] to the non-compatibility field 111 in the pattern agenesis field 11 and the pattern formation field 10 among the paraffin layers 101, and evaporates paraffin, when a fluid does not contain a polar molecule. As energy, although it thinks of three persons of light, heat or light, and heat, in order to remove the paraffin of a specific detailed field, it is desirable to use a laser beam. For example, the laser beam of short wavelength is irradiated and paraffin is evaporated.

[0036] The paraffin layer 101 is left behind to the compatibility field 110 of the pattern formation field 10 by the above production process. If the fluid which does not contain a polar molecule is made to adhere to this substrate, it will adhere only to the pattern formation field 10. In addition, when the fluid made to adhere contains a polar molecule, energy is supplied only to the compatibility field 110 in the pattern formation field 10, and paraffin is removed. The fluid which contains a polar molecule only to the compatibility field 110 by this can be made to adhere.

[0037] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that paraffin may remain in the non-compatibility field 111 of the pattern agenesis field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that paraffin may be left behind to the compatibility field 110 of the pattern formation field 10.

[0038] (Operation gestalt 3) The operation gestalt 3 of this invention is related with the manufacture approach of the substrate explained with the above-mentioned operation gestalt 1. The self-assembly-ized monomolecular film of a sulfur compound is especially used with this gestalt.

[0039] With this operation gestalt, a metal layer is prepared in a pedestal, it is immersed in the solution containing a sulfur compound, and a self-assembly-ized monomolecular film is formed. A sulfur compound consists of molecules equipped with a sulfhydryl group. This sulfur compound is dissolved in the ethanol solution of 1-10mM. If it is immersed and the substrate which formed the golden film in this solution is left at a room temperature for about 1 hour, sulfur compounds will gather spontaneously on

the front face of the golden film. And a golden atom and a golden sulfur atom join together in covalent bond, and a sulfur content child's monomolecular film is formed two-dimensional on the surface of gold. Although the thickness of this film is based also on the molecular weight of a sulfur compound, it is about 10-50Å. By adjusting the presentation of a sulfur compound, to a fluid, it can be made compatibility, or can be made non-compatibility, or a self-assembly-ized monomolecular film can be set up freely.

[0040] As a sulfur compound, thiol compounds are desirable. Thiol compounds mean the generic name of an organic compound (R-SH; R is hydrocarbon groups, such as an alkyl group (alkyl group)) with a sulfhydryl group (-SH; mercapt group) here.

[0041] When the case where a fluid contains a polar molecule, and a polar molecule are not included, it divides into Table 2, and the typical presentation of affinitive thiol compounds is shown in a fluid. n and m are taken as the natural number.

[0042]

[Table 2]

対象	流動体が極性分子を含む	流動体が極性分子含まず
硫黄化合物の組成	OH基またはCO ₂ H基を有する硫黄化合物。H O ₂ C (CH ₂) _n SH、HO (CH ₂) _n SH等	C _n H _{2n+2} SHで表わされる直鎖のアルカン (alkane) チオール、CF ₃ (CF ₂) _m (CH ₂) _n SHで表わされるフッ素系の化合物
基板の組成	ポリビニルアルコール、ポリアクリル酸、ナイロン、ガラス	ペークライト、ポリエステル、ポリエチレン、テフロン、PMM A、ポリプロピレン、塩化ビニル

[0043] As shown in Table 2, to a polar molecule, it can be made compatibility or making it compatibility **** can set up a sulfur compound monomolecular film freely by changing a presentation to a nonpolar molecule. The production process sectional view of the manufacture approach of the substrate in this operation gestalt 3 is shown in drawing 8 .

[0044] Metal layer formation process (drawing 8 (a)) : A metal layer formation process is a process which forms the metal layer 102 on a pedestal 100. A pedestal 100 chooses whether according to a fluid, it is made a hydrophilic property to a fluid, or it is made a non-hydrophilic property (hydrophobicity, oleophilic). A pedestal 100 is made into a hydrophilic property when a fluid does not contain a polar molecule. A pedestal 100 is chosen as a hydrophobic ingredient when a fluid contains a polar molecule. Stability chemical and physical as a metal layer 102 to gold (Au) is desirable. You may be metals, such as silver [which adsorbs a sulfur compound besides gold chemically] (Ag), copper (Cu), indium (In), and gallium-arsenic (Ga-As). As the formation approach of the metal layer 102, well-known techniques, such as wet plating, a vacuum deposition method, and a vacuum spatter, can be used. However, if it is the forming-membranes method which can form a metaled thin film in homogeneity by fixed thickness, it will not be limited to especially the class. Since the role of a metal layer is fixing a sulfur compound layer, the metal layer itself may be very thin. Therefore, what is necessary is just to form in the thickness of about 500-2000Å.

[0045] In addition, depending on a substrate 100, the adhesion of the metal layer 102 and a pedestal 100 worsens. In such a case, in order to raise the adhesion of the metal layer 102 and a pedestal 100, an interlayer is formed between a pedestal and a metal. As for an interlayer, it is desirable that they are material [which strengthens the bonding strength between a pedestal 100 and the metal layer 102], for

example, (Nickel nickel) chromium (Cr) (tantalum Ta) nozzle, **, or those alloys (nickel-Cr etc.). If an interlayer is prepared, a sulfur compound layer will stop being able to exfoliate easily to the increase of the bonding strength of a pedestal 100 and the metal layer 102, and mechanical friction. In forming an interlayer in the bottom of the metal layer 102, it forms Cr by the vacuum spatter or the ion plating method by the thickness of 100-300Å.

[0046] Pattern formation process (drawing 8 (b)) : A pattern formation process gives energy to a part among the metal layers 102 formed on the pedestal 100, and evaporates a metal. A fluid when a pedestal 100 shows [a fluid] hydrophobicity including a polar molecule supplies energy to the non-compatibility field 111 in the pattern agensis field 11 and the pattern formation field 10, when a pedestal 100 shows a hydrophilic property excluding a polar molecule. A fluid when a pedestal 100 shows [a fluid] hydrophobicity excluding a polar molecule supplies energy only to the compatibility field 110 in the pattern formation field 10, when a pedestal 100 shows a hydrophilic property including a polar molecule. As energy, light is desirable and the laser beam which can supply the high energy of short wavelength especially is desirable. It is made to move, doubling pickup 200 with the pattern of a compatibility field or a non-compatibility field, and making a laser beam inject. Since the metal which forms the metal layer 102 evaporates, a pedestal 100 exposes the field where the laser beam was irradiated.

[0047] Sulfur compound immersion process (drawing 8 (c)) : A sulfur compound immersion process is a process which is immersed in the solution of a sulfur compound in the substrate containing the metal layer from which some metals were removed, and forms the self-assembly-ized monomolecular film 103. The solution which melted the thiol compounds of a presentation to use for the self-assembly-ized monomolecular film 103 first to an organic solvent like ethanol or isopropyl alcohol is prepared. For example, when a fluid wants to make the self-assembly-ized monomolecular film 103 concerned into the compatibility field 110 including a polar molecule, the sulfur compound solution of a hydrophilic property is manufactured using the sulfur compound which has an OH radical or CO₂H set. When a fluid wants to make the self-assembly-ized monomolecular film 103 concerned into the compatibility field 110 excluding a polar molecule, a hydrophobic sulfur compound solution is manufactured using the sulfur compound which has an alkyl group. And the pedestal 100 which carried out patterning of the metal layer 102 is immersed into the solution. The sulfur compound concentration of a solution is 0.01mM(s), and about 50 degrees C and immersion time amount make [solution temperature] immersion conditions 5 to about 30 minutes from ordinary temperature. Churning or circulation of a solution is performed in order to carry out formation of a sulfur compound layer to homogeneity during immersion processing.

[0048] If even clarification of a surface of metal can be maintained, in order that a sulfur content child may self-assembly-ize himself and may form a monomolecular film, strict condition management is an unnecessary process. When immersion is completed, the monomolecular film of the sulfur content child who has firm adhesion only on the surface of gold is formed.

[0049] The solution which finally adhered to the pedestal front face is washed and removed. Since the sulfur compound molecule adhering to parts other than a gold layer has not carried out covalent bond, it is removed by easy washing of the rinse by ethyl alcohol etc.

[0050] According to the above process, the substrate 1 with which the self-assembly-ized monomolecular film 103 was formed in the compatibility field 110 in the pattern formation field 10 is manufactured.

[0051] As described above, according to this operation gestalt 3, the substrate to which it can be stabilized and a liquid phase ingredient can be made to adhere along with a pattern can be manufactured by using the self-assembly-ized monomolecular film of a sulfur compound. Since especially the self-assembly-ized monomolecular film of a sulfur compound is strong to wear and physical and chemical resistance is high, it is suitable for the substrate which is an industrial use article. Moreover, if a sulfur compound is chosen, according to the property of a pedestal, a self-assembly-ized monomolecular film will be freely made into a hydrophilic property and a non-hydrophilic property. A detailed pattern can be formed if a laser beam is furthermore used.

[0052] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that the self-assembly-ized monomolecular film in which non-compatibility is shown may remain in the non-compatibility field 111 of the pattern agenesis field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that the self-assembly-ized monomolecular film in which compatibility is shown may be left behind to the compatibility field 110 of the pattern formation field 10.

[0053] (Operation gestalt 4) The operation gestalt 4 of this invention is related with the manufacture approach of the substrate of the operation gestalt 1 by plasma treatment. Plasma treatment is the approach of performing glow discharge of the high voltage under a predetermined atmospheric pressure, and performing surface treatment of a substrate. If plasma treatment is performed to an insulating substrate like glass or plastics, a lot of unreacted radicals and bridge formation layers will utter on a substrate front face. If this is exposed to atmospheric air or an oxygen ambient atmosphere, an unreacted radical can oxidize and a carbonyl group and a hydroxyl group can be formed. Since that of these is a polar group, it is affinitive to the fluid containing a polar molecule. On the other hand, many of glass and plastics show non-compatibility to the fluid containing a polar molecule. Therefore, a compatibility field and a non-compatibility field are generable by carrying out plasma treatment of the pattern formation side of a substrate alternatively. Plasma treatment only of the field is carried out in part, and a compatibility field and a non-compatibility field are made to appear by giving a mask based on this principle with this operation gestalt.

[0054] Next, with reference to drawing 9, the manufacture approach of the substrate of this operation gestalt 4 is explained.

Mask formation process (drawing 9 (a)) : A mask formation process is a process which gives a mask 201 on a pedestal 100. The glass substrate by which Teflon processing was carried out as a pedestal 100 in the material for which an unreacted radical may appear by plasma exposure, predetermined plastics, and a front face is used. Pattern formation of the mask 201 is carried out so that only a field to make into hydrophobicity on a pedestal 100 may require a mask. For example, in using what contains a polar molecule as a fluid, it prepares a mask with which the non-compatibility field 111 in the pattern agenesis field 11 and the pattern formation field 10 is exposed. As an ingredient of a mask, various masks, such as an exposure mask, an emulsion mask, and a hard surface mask blank, can be formed. In using an exposure mask, it forms chromium, chrome oxide, silicon, silicon oxide, an oxide film, etc. with vacuum deposition, sputtering, a CVD method, etc.

[0055] Plasma exposure process (drawing 9 (b)) : A plasma exposure process is a process to carry out plasma exposure 202 on the pedestal 100 to which the mask 201 was given. In 10⁻¹-100Pa argon gas, using a neon transformer, a plasma exposure impresses the electrical potential difference of hundreds of volts to thousands of volts, and glow discharge of it is carried out and it is performed. In addition, the approach of forming the discharge plasma by capacity coupling or dielectric association using the discharge power source of a radio frequency band, the method of supplying microwave power to a discharge container with a waveguide, and making the discharge plasma form, etc. are applicable.

[0056] Ion, an electron, an excited atom or a molecule, a radical, etc. occur as an activity particle in the plasma, and the molecular structure of the macromolecule of pedestal 100 front face changes with these processings. That is, a lot of unreacted radicals and bridge formation layers appear into the part by which the plasma 202 was irradiated.

[0057] Surface treatment process (drawing 9 (c)) : A surface treatment process is a process which oxidizes pedestal 100 front face by which plasma treatment was carried out, and reforms a front face. The pedestal 100 in which the unreacted radical and the bridge formation layer appeared by the above-mentioned plasma treatment is exposed to the bottom of atmospheric air or an oxygen ambient atmosphere. The unreacted radical of pedestal 100 front face oxidizes, and produces a hydroxyl group and a carbonyl group. These polar groups show the hydrophilic property which is easy to get wet to water. On the other hand, a mask is carried out, and the field by which plasma treatment was not carried out is still plastics, and shows a non-hydrophilic property.

[0058] Therefore, the field by which plasma treatment was carried out turns into the compatibility field 110, and the field by which plasma treatment was not carried out turns into the non-compatibility field 111 or the pattern agensis field 11.

[0059] As mentioned above, according to this operation gestalt 4, by the thing which constitute a pedestal by plasma treatment and for which the molecular structure of a field is changed in part, since the film of a non-hydrophilic property can be changed into the film of a hydrophilic property, the substrate of the operation gestalt 1 can be offered, without forming a new layer. Since the presentation of a molecular level is changed, this substrate is stable.

[0060] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that a plasma exposure may be carried out to the non-compatibility field 111 of the pattern agensis field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that the plasma exposure of the compatibility field 110 of the pattern formation field 10 may be carried out.

[0061] (Operation gestalt 5) The operation gestalt 5 of this invention is related with the manufacture approach of the substrate of the operation gestalt 1 by UV irradiation. UV irradiation can be used like the above-mentioned plasma treatment as a surface treatment means of resin. Since these resin is organic macromolecules without a polarity when the substrate is formed by resin like polyester or polyethylene or is covered with these resin thin film, originally the front face becomes compatibility to the fluid which does not contain a polar molecule in non-compatibility to the fluid containing a polar molecule. However, if ultraviolet rays are irradiated on this resin front face, a front face will be activated like plasma treatment and an OH radical and a COOH radical will appear. Since these radicals are polar groups, they come to show compatibility to the fluid containing a polar molecule. By making ultraviolet rays irradiate alternatively with a mask among the pattern formation sides of a substrate, a compatibility field and a non-compatibility field can be formed easily.

[0062] Next, with reference to drawing 10, the manufacture approach of the substrate of this operation gestalt 5 is explained.

Mask formation process (drawing 10 (a)) : A mask formation process is a process which gives a mask 203 on a pedestal 100. As a pedestal 100, plastics, such as a material for which an unreacted radical may appear by plasma exposure especially polyester, and polyethylene, etc. is used. Or you may be substrates, such as glass with which the thin film by these plastics is formed in the front face. Pattern formation of the mask 203 is carried out so that only a field to make into hydrophobicity on a pedestal 100 may require a mask. For example, in using the fluid containing a polar molecule, the compatibility field 110 in the pattern formation field 10 is exposed, and it prepares a mask with which the other field is covered. As an ingredient of a mask, various masks, such as an exposure mask, an emulsion mask, and a hard surface mask blank, can be formed. In using an exposure mask, it forms chromium, chrome oxide, silicon, silicon oxide, an oxide film, etc. with vacuum deposition, sputtering, a CVD method, etc.

[0063] UV irradiation process (drawing 10 (b)) : A UV irradiation process is a process which carries out UV irradiation on the pedestal 100 to which the mask 203 was given. It carries out to UV irradiation using an ultraviolet ray lamp. By this processing, ultraviolet rays give energy to the macromolecule of pedestal 100 front face, excite a molecule, and change covalent-bond structure. A lot of unreacted radicals and bridge formation layers to the exposure field of a pedestal 100 to which ultraviolet rays 204 were irradiated by this appear.

[0064] Surface treatment process (drawing 10 (c)) : A surface treatment process is a process which oxidizes pedestal 100 front face by which UV irradiation was carried out, and reforms a front face. If the pedestal 100 in which the unreacted radical and the bridge formation layer appeared by the above-mentioned UV irradiation is exposed to the bottom of atmospheric air or an oxygen ambient atmosphere, the unreacted radical of pedestal 100 front face will oxidize, and a hydroxyl group and a carbonyl group will arise. These polar groups show the compatibility (hydrophilic property) which is easy to get wet to fluids, such as water containing a polar molecule. The field which the mask was carried out on the other hand, and was not exposed shows a property with plastics. That is, non-compatibility is shown to the fluid containing a polar molecule. Therefore, the field by which UV irradiation was carried out turns into

the compatibility field 110, and the field by which UV irradiation was not carried out turns into the non-compatibility field 111 or the pattern agensis field 11.

[0065] As mentioned above, according to this operation gestalt 5, by the thing which constitute a pedestal by UV irradiation and for which the molecular structure of a field is changed in part, since the film of a non-hydrophilic property can be changed into the film of a hydrophilic property, the substrate of the operation gestalt 1 can be offered, without forming a new layer. Since the presentation of a molecular level is changed, this substrate is stable.

[0066] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that UV irradiation may be carried out to the non-compatibility field 111 of the pattern agensis field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that UV irradiation of the compatibility field 110 of the pattern formation field 10 may be carried out.

[0067] (Operation gestalt 6) The operation gestalt 6 of this invention is related with the manufacture approach of the substrate of the operation gestalt 1 of having used the photolithography method. Next, with reference to drawing 11, the manufacture approach of the substrate of this operation gestalt 6 is explained. In the following explanation, a pedestal 100 shall form in the compatibility field 110 in the pattern formation field 10 the layer which shows non-compatibility to a fluid and shows compatibility to a fluid by the photolithography method. However, when a pedestal 100 shows compatibility to a fluid, the layer which shows non-compatibility to a fluid will be formed in the non-compatibility field 111 in the pattern agensis field 11 and the pattern formation field 10 by the photolithography method.

[0068] Compatibility film formation process (drawing 11 (a)) : A compatibility film formation process is a process which forms the thin film 104 by the ingredient which shows compatibility to a pedestal front face to a fluid. As an ingredient in which compatibility is shown to the fluid containing a polar molecule, a silane coupling agent with an OH radical, a COOH radical, two NH(s), etc. is mentioned. As the formation approach of a thin film, a spin coat method, a dip method, and the well-known thin film formation approach are applicable. The thickness of a thin film 104 is enough if the thickness of extent which can be formed in almost uniform thickness by the above-mentioned manufacture approach is securable.

[0069] Exposure process (drawing 11 (b)) : An exposure process is a process which applies a photoresist 105 on a thin film 104, exposes and develops negatives after giving the mask set by pattern formation, and leaves a photoresist 105. As a photoresist, well-known ingredients, such as PMMA, PBS, and polyimide, can be applied, and it sets by the relation between the etching approach and a thin film material 104. The same mask as what explained the photoresist 105 with the above-mentioned operation gestalten 4 or 5 after spreading by the applying methods, such as the spinner method, a spray method, the roll coater method, and dip coating, is given, and a photoresist 105 is exposed. When a photoresist is a positive type, a wrap mask is given for the compatibility field 110 in the pattern formation field 10. When a photoresist is a negative mold, a wrap mask is given for the non-compatibility field 111 in the pattern agensis field 11 and the pattern formation field 10. And ordinary light or far-ultraviolet-rays exposure is performed from on a mask, and a photoresist is exposed.

[0070] Development process (drawing 11 (c)) : A development process is a process which leaves the photoresist which developed the photoresist 105 made to expose and was doubled with the pattern. Negatives are developed by making a developer adhere with a spray method, a dip method, etc. Subsequently, a rinse is made to adhere by the same approach and an unnecessary photoresist is removed. The photoresist 105 which met the pattern on the thin film 104 by this processing is left behind.

[0071] Etching process (drawing 11 (d)) : An etching process is a process which etches the thin film 104 with which the photoresist 105 was left behind, and removes the unnecessary thin film 104. Both wet etching and the dry etching of the etching approach are available. What was suitable for etching of the thin film 104 which is an etched ingredient as etching gas in the etching reagent in wet etching or dry etching is chosen.

[0072] Of the above process, the thin film 104 of the field except the compatibility field 110 in the

pattern formation field 10 is removed, and the pattern formation field 10 and the pattern agenesi field 11 are formed in pedestal 100 front face.

[0073] As described above, even if it applies the photolithography method frequently used as the thin film pattern formation approach, according to this operation gestalt 6, the substrate of the operation gestalt 1 can be manufactured.

[0074] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that the thin film in which non-compatibility is shown may remain in the non-compatibility field 111 of the pattern agenesi field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that the thin film in which compatibility is shown may be left behind to the compatibility field 110 of the pattern formation field 10.

[0075] (Operation gestalt 7) The operation gestalt 7 of this invention is related with the manufacture approach of the substrate of the operation gestalt 1 by giving a charge to a substrate. The production process sectional view of the substrate in this operation gestalt 7 is shown in drawing 12.

Charge impression process (drawing 12 (a)): A charge impression process is a process which makes a pedestal 100 produce a charge. The ingredient which is easy to be charged as a pedestal 100 is used. For example, polyethylene terephthalate etc. can be used in polymeric materials. In addition, it is also possible to use inorganic semi-conductors, such as a selenium system used as a photo conductor of a laser beam printer, a Si:H system, a CdS system, and a ZnO system, PVK/Se, PVK-TNF, CGL/CTL, CTL/CGL, CTL (CGL), etc. In order to impress a charge 106 to pedestal 100 front face, charge impression means, such as a corona-electrical-charging machine used by the laser beam printer, are used. This corona-electrical-charging machine etc. is brought close to a substrate front face, and a front face is electrified uniformly. The direct-current high voltage of 6-8kV is specifically impressed to a tungsten wire with a diameter of 50 micrometers - 100 micrometers, it separates from a pedestal front face 8-10mm, and corona discharge is performed.

[0076] Decharge process (drawing 12 (b)) : A decharge process is a process which impresses energy 206 to the pattern formation side of the pedestal 100 charged uniformly alternatively, and misses a charge 106 partially. That is, by supplying light energy etc., in the exposure section, generation and transportation of an optical carrier take place, surface charge loses, and an electrostatic latent image is formed in a front face. As an energy source of supply, a laser beam is desirable. It is because the latent image doubled with the detailed pattern can be formed. In addition, light energies, such as ultraviolet rays, may be added using a mask. The decharged field is made into the non-compatibility field 111 in the pattern agenesi field 11 and the pattern formation field 10 when polyethylene terephthalate is used as pedestal 100 ingredient as mentioned above. In a fixing process, it is not fixed to a powder ingredient, but the decharged field is exposed [pedestal 100 front face] with as.

[0077] Adhesion process (drawing 12 (d)) : An adhesion process is a process which makes the powder ingredient 207 adhere to the electrification field which was not decharged using electrostatic attraction. As a powder ingredient 206, an ingredient like the toner in a laser beam printer is said, and an ingredient with possible making it adhere in electrostatic force is used, for example. Moreover, after fixing, the ingredient which becomes the front face which shows compatibility to the fluid containing a polar molecule is used. As such an ingredient, it is available in the mixture of steel materials, a bulb, iron powder, the thing that carried out the resin coat of these, the magnetic substance, and resin etc. Specifically, it adheres to the field charged on a pedestal 100, and the field 206 to which the charge 206 exists [the powder ingredient 207 of reversed polarity] with electrostatic attraction.

[0078] Fixing process (drawing 12 (d)) : A fixing process is a process to which the powder ingredient 207 adhering to pedestal 100 front face is fixed. When the powder ingredient 207 adheres to the electrification field of a pedestal 100 with the above-mentioned electrostatic attraction, heat is applied to a pedestal 100, and you dissolve the powder ingredient 207, and make it fixed to a pedestal 100. Consequently, the compatibility field 110 where a powder ingredient comes to be established is formed all over the pattern formation field 10.

[0079] As described above, with this operation gestalt 7, the substrate of the operation gestalt 1

equipped with the compatibility field and the non-compatibility field can be manufactured by decharging a substrate and fixing a powder ingredient.

[0080] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, it manufactures so that the thin film by the powder ingredient in which non-compatibility is shown may remain in the non-compatibility field 111 of the pattern agensis field 11 and the pattern formation field 10. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, it manufactures so that the thin film by the powder ingredient in which compatibility is shown may be left behind to the compatibility field 110 of the pattern formation field 10.

[0081] (Operation gestalt 8) The operation gestalt 8 of this invention is related with the manufacture approach which uses a printing technique for a pedestal and forms the direct film. The production process sectional view of the substrate of this operation gestalt 8 is shown in drawing 13 . Drawing 13 explains the manufacture approach at the time of using offset printing which is a kind of monotonous printing.

Presswork (drawing 13 (a)) : Presswork is a process which forms a thin film without the film or compatibility which has compatibility to a fluid by the predetermined printing approach. It requires that an airline printer can be printed to the hard matter like a substrate. The difference from the conventional printing is a point using the ingredient which forms the compatibility field or non-compatibility valley of this invention instead of ink. When non-compatibility is shown to the fluid with which a pedestal 100 contains a polar molecule, an ingredient is made to adhere only to the compatibility field 110 in the pattern formation field 10 with this airline printer. When compatibility is shown to the fluid with which a pedestal 100 contains a polar molecule, an ingredient is made to adhere to the non-compatibility field 111 in the pattern agensis field 11 and the pattern formation field 10 with this airline printer. In this drawing, only the imprint roller 208 is illustrated among offset-printing equipment. A thin film material is imprinted by the pattern formation side of a pedestal 100 from the ingredient adhering to the imprint roller 208. It is possible for it not to be based on offset printing but to apply the approach using the monotonous print processes, the letterpress, the intaglio, the mimeograph, static electricity, and the MAG of direct print processes and others etc. as the printing approach. That is, the printing approach with possible making a thin film material adhere to a pedestal instead of ink by the well-known printing approach is applicable suitably.

[0082] The fixing approach (drawing 13 (b)) : If a thin film material is made to imprint by the pedestal 100, a thin film material will be stabilized with the application of well-known techniques, such as heat treatment. According to this process, the substrate with which the thin film was formed only in the compatibility field 110 of the pattern formation field 10 can be manufactured.

[0083] As described above, according to this operation gestalt 8, a substrate as shown in the operation gestalt 1 can be manufactured by making a thin film material adhere using well-known print processes.

[0084] In addition, when the pedestal 100 is formed with the ingredient in which compatibility is shown to a fluid, the thin film which shows non-compatibility to the non-compatibility field 111 of the pattern agensis field 11 and the pattern formation field 10 is printed. When the pedestal 100 is formed with the ingredient in which non-compatibility is shown to a fluid, the thin film which shows compatibility to the compatibility field 110 of the pattern formation field 10 is printed.

[0085] (Other modifications) it is not based on the above-mentioned operation gestalt, but this invention can be deformed and applied to versatility for example, the arrangement shown with the pattern configuration and the operation gestalt 1 of a compatibility field which are formed in a pedestal is mere instantiation, and can be changed into versatility. a punctiform pattern and a line -- various the magnitude, configurations, and arrangement can be looked like [a pattern], and it can change. It is because these elements are what becomes settled corresponding to the property of a fluid.

[0086] moreover, if the method of manufacturing a substrate is not limited to the thing of the above-mentioned operation gestalt 2 to the operation gestalt 8 but it is divided into a pattern formation field and a pattern agensis field, deforming into versatility is possible.

[0087]

[Effect of the Invention] Since it has the configuration which has arranged regularly the field which is

affinitive to a fluid, and the field without compatibility on a substrate according to this invention, the pattern formation field of fixed area can be provided with the substrate which enables optimum dose adhesion of a fluid.

[0088] Since it has the process which arranges regularly the field which is affinitive to a fluid, and a field without compatibility on a substrate according to this invention, the pattern formation field of fixed area can be provided with the manufacture approach of the substrate which enables optimum dose adhesion of a fluid.

[0089] Therefore, manufacture of the detailed pattern which could not but apply to which and form many processes with an expensive facility at works etc. is attained cheaply easily conventionally.

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] It is the substrate for specific pattern formation which is equipped with the pattern-formation field which is a substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and was patternized by the specific configuration for forming said thin film, and is characterized by to be arranged and constituted said pattern-formation field according to a predetermined regulation between the non-compatibility fields where the compatibility field which is affinitive to said fluid does not have compatibility to the fluid concerned.

[Claim 2] The substrate for specific pattern formation according to claim 1 with which two or more said pattern formation fields arrange and consist of fixed regulations.

[Claim 3] The substrate for specific pattern formation according to claim 1 with which said pattern formation field is formed and constituted by the fixed graphic form configuration.

[Claim 4] The process which applies paraffin and forms a paraffin layer on the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid, So that the compatibility field which has compatibility to said fluid in the pattern formation field which forms said patternized film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned The manufacture approach of the substrate characterized by having the process which supplies energy to said compatibility field and removes said paraffin layer.

[Claim 5] The process which applies paraffin and forms a paraffin layer on the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows non-compatibility to said fluid, [in the pattern formation field which forms said patternized thin film] The process which supplies energy to said non-compatibility field, and removes said paraffin layer so that the compatibility field which is affinitive to said fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process which supplies energy to the pattern agensis field which does not form the patternized thin film, and removes said paraffin layer.

[Claim 6] The process which forms a metal layer with a predetermined metal on the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid, [in the pattern formation field which forms said patternized thin film] The process which supplies energy to said compatibility field and removes said metal layer so that the compatibility field which is affinitive to said fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 7] The process which forms a metal layer with a predetermined metal on the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was

made to adhere and was patternized, and shows non-compatibility to said fluid, The process which supplies energy to fields other than the pattern formation field which forms said patternized thin film, and removes said metal layer, The process which supplies energy to said non-compatibility field, and removes said metal layer so that the compatibility field which has compatibility to said fluid in said pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 8] Said sulfur compound is the manufacture approach of a substrate given in any 1 term of claim 6 equipped with a property opposite to said pedestal front face, or claim 7 about the compatibility over said fluid.

[Claim 9] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows non-compatibility to said fluid Cover fields other than the pattern formation field which forms said patternized thin film, and it sets to the pattern formation field concerned. The process which carries out the mask of said non-compatibility field with a wrap mesh mask so that the compatibility field which is affinitive to said fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process which carries out plasma etching of the pedestal to which said mesh mask was carried out, and the process which carries out reforming processing of the pedestal front face excited by said plasma etching.

[Claim 10] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid The process which carries out the mask of said compatibility field with a wrap mesh mask so that the compatibility field which is affinitive to said fluid in the pattern formation field which forms said patternized thin film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process which carries out plasma etching of the pedestal to which said mesh mask was carried out, and the process which carries out reforming processing of the pedestal front face excited by said plasma etching.

[Claim 11] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows non-compatibility to said fluid Cover fields other than the pattern formation field which forms said patternized thin film, and it sets to the pattern formation field concerned. The process which carries out the mask of the non-compatibility field concerned with a wrap mesh mask so that the compatibility field which is affinitive to said fluid may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Claim 12] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid The process which carries out the mask of the compatibility field concerned with a wrap mesh mask so that the compatibility field which is affinitive to said fluid may be arranged in the pattern formation field which forms said patternized thin film according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Claim 13] The process which forms a thin film with the thin film material which has compatibility to said fluid on the pedestal which is the manufacture approach of the substrate for forming the thin film

which the predetermined fluid was made to adhere and was patternized, and was equipped with the front face which does not have compatibility to said fluid, The process which prepares a photoresist so that the compatibility field which is affinitive to said fluid in the pattern formation field for forming said patternized thin film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process which etches fields other than the field in which the pedestal in which said photoresist was formed was etched into, and said photoresist was prepared.

[Claim 14] The process which forms a thin film with the thin film material which does not have compatibility to said fluid on the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and was equipped with the front face which is affinitive to said fluid, Fields other than the pattern formation field for forming said patternized thin film are covered. And the process which prepares a wrap photoresist for the non-compatibility field concerned so that the compatibility field which is affinitive to said fluid in the pattern formation field concerned may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of the substrate characterized by having the process which etches fields other than the field in which the pedestal in which said photoresist was formed was etched into, and said photoresist was prepared.

[Claim 15] The process which gives a charge all over the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows non-compatibility to said fluid, The process which energy is given [process] to fields other than the pattern formation field which forms said patternized thin film, and extinguishes a charge, The process which extinguishes the charge of the non-compatibility field concerned so that the compatibility field which is affinitive to said fluid in said pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of a substrate equipped with the process which combines the predetermined matter with the compatibility field to which a charge did not disappear.

[Claim 16] The process which gives a charge all over the pedestal which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid, The process which extinguishes the charge of the compatibility field concerned so that the compatibility field which is affinitive to said fluid in the pattern formation field which forms said patternized thin film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned, The manufacture approach of a substrate equipped with the process which combines the predetermined matter with the non-compatibility field to which a charge did not disappear.

[Claim 17] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows non-compatibility to said fluid So that the compatibility field which is affinitive to said fluid in the pattern formation field which forms said patternized thin film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned The manufacture approach of the substrate characterized by equipping the compatibility field concerned with the process which prints the compatibility film.

[Claim 18] In the pedestal top which is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized, and shows compatibility to said fluid Fields other than the pattern formation field which forms said patternized thin film, The manufacture approach of the substrate characterized by equipping the compatibility field arranged so that the compatibility field which shows compatibility to said fluid in the pattern formation field concerned may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned with the process which prints the non-compatibility film.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the substrate of the operation gestalt 1, and (a) is a top view and (b) is the sectional view.

[Drawing 2] the example of arrangement of the compatibility field in the pattern formation field of the substrate of the operation gestalt 1, and a non-compatibility field -- it is -- (a) -- a rectangular pattern and (b) -- the modification and (c) -- a circular pattern and (d) -- the modification and (e) -- a triangle pattern and (f) -- the modification and (g) -- a line -- it is a pattern.

[Drawing 3] It is a substrate top view explaining the modification of the configuration of a pattern formation field.

[Drawing 4] It is drawing explaining an operation of the substrate in the operation gestalt 1. (a) -- the case of a punctiform pattern -- (b) -- a line -- it is the case of a pattern.

[Drawing 5] It is a sectional view at the time of breathing out a drop to the usual substrate, and (a) is immediately after the regurgitation and (b) is after desiccation.

[Drawing 6] It is a top view at the time of breathing out a drop to the usual substrate, and (a) is immediately after the regurgitation and (b) is after desiccation.

[Drawing 7] (a) - (b) is the manufacture approach of the substrate of the operation gestalt 2.

[Drawing 8] (a) - (c) is the manufacture approach of the substrate of the operation gestalt 3.

[Drawing 9] (a) - (c) is the manufacture approach of the substrate of the operation gestalt 4.

[Drawing 10] (a) - (c) is the manufacture approach of the substrate of the operation gestalt 5.

[Drawing 11] (a) - (d) is the manufacture approach of the substrate of the operation gestalt 6.

[Drawing 12] (a) - (d) is the manufacture approach of the substrate of the operation gestalt 7.

[Drawing 13] (a) - (b) is the manufacture approach of the substrate of the operation gestalt 8.

[Description of Notations]

1, 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i -- Substrate,

10 -- Pattern formation field

11 -- Pattern agenesis field

110 -- Compatibility field,

111 -- Non-compatibility field,

100 -- Pedestal

[Translation done.]

* NOTICES *

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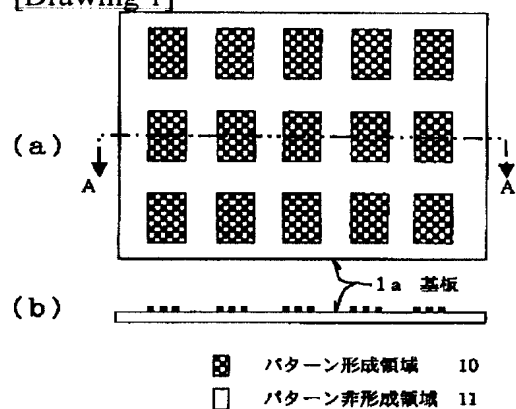
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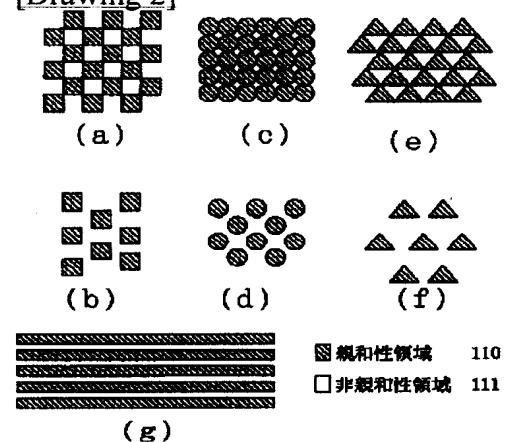
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DRAWINGS

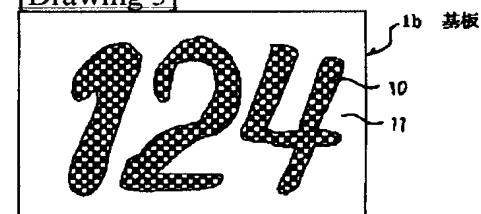
[Drawing 1]



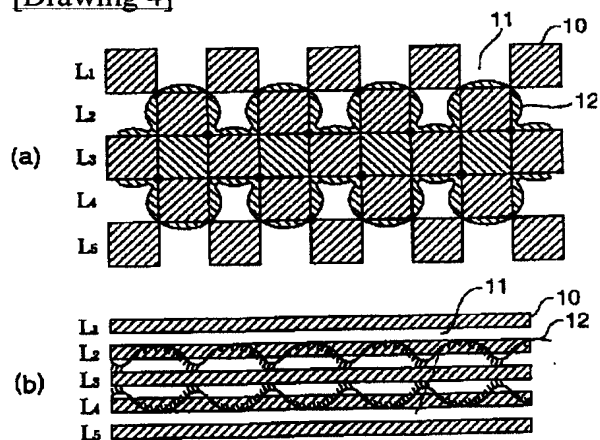
[Drawing 2]



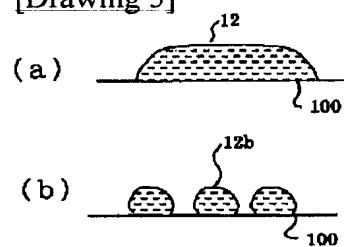
[Drawing 3]



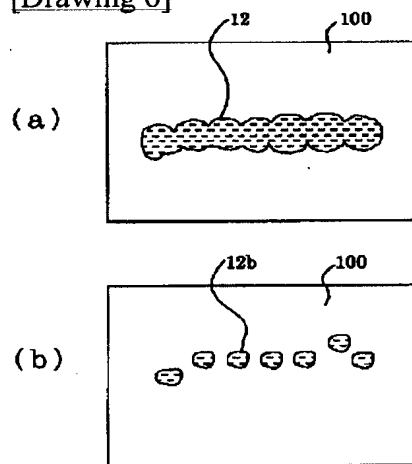
[Drawing 4]



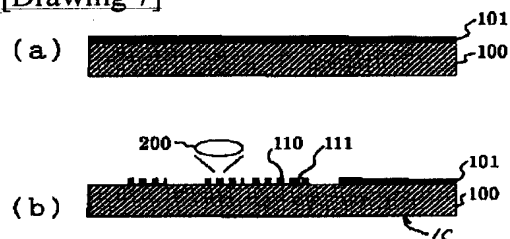
[Drawing 5]



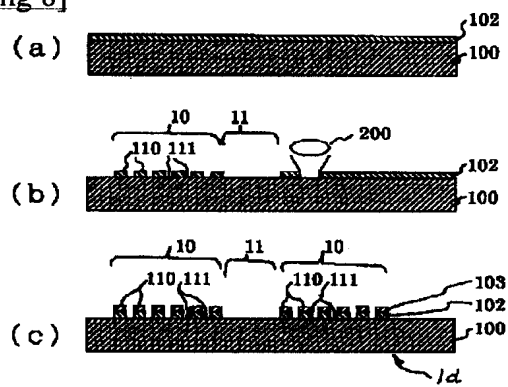
[Drawing 6]



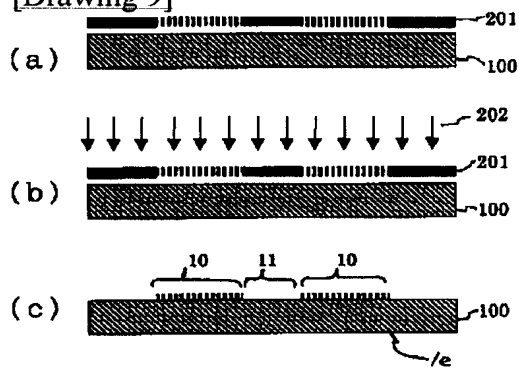
[Drawing 7]



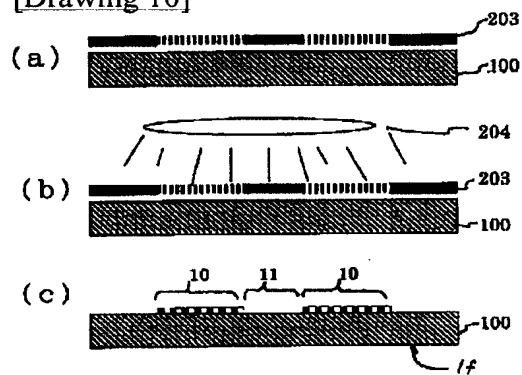
[Drawing 8]



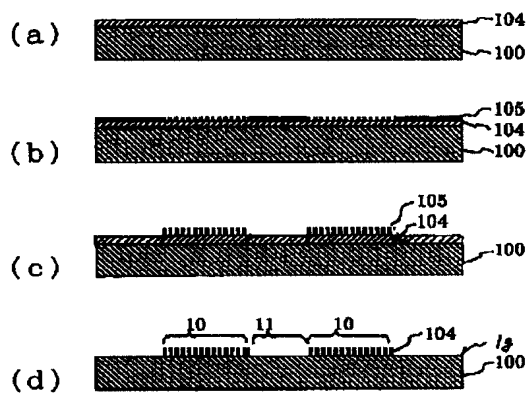
[Drawing 9]



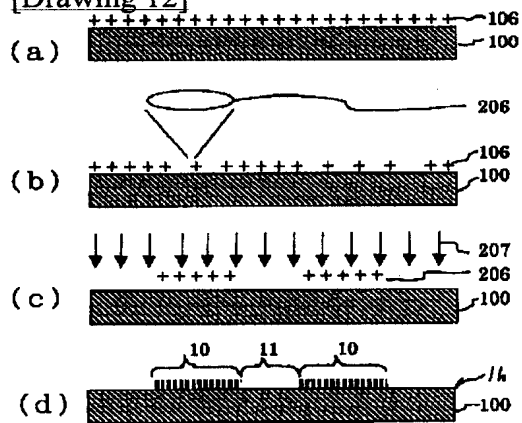
[Drawing 10]



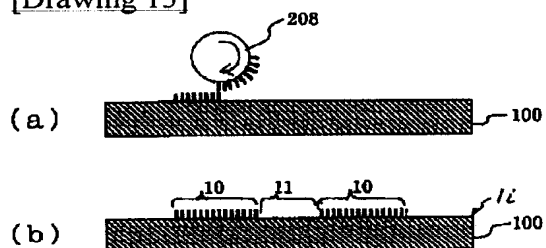
[Drawing 11]



[Drawing 12]



[Drawing 13]



[Translation done.]

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WRITTEN AMENDMENT

----- [a procedure revision]

[Filing Date] May 15, Heisei 10

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] Easy explanation of a drawing

[Method of Amendment] Modification

[Proposed Amendment]

[Brief Description of the Drawings]

[Drawing 1] It is the substrate of the operation gestalt 1, and (a) is a top view and (b) is the sectional view.

[Drawing 2] the example of arrangement of the compatibility field in the pattern formation field of the substrate of the operation gestalt 1, and a non-compatibility field -- it is -- (a) -- a rectangular pattern and (b) -- the modification and (c) -- a circular pattern and (d) -- the modification and (e) -- a triangle pattern and (f) -- the modification and (g) -- a line -- it is drawing showing a pattern.

[Drawing 3] It is a substrate top view explaining the modification of the configuration of a pattern formation field.

[Drawing 4] It is drawing explaining an operation of the substrate in the operation gestalt 1. (a) -- the case of a punctiform pattern -- (b) -- a line -- it is the case of a pattern.

[Drawing 5] It is a sectional view at the time of breathing out a drop to the usual substrate, and (a) is immediately after the regurgitation and (b) is after desiccation.

[Drawing 6] It is a top view at the time of breathing out a drop to the usual substrate, and (a) is immediately after the regurgitation and (b) is after desiccation.

[Drawing 7] (a) - (b) is drawing showing the manufacture approach of the substrate of the operation gestalt 2.

[Drawing 8] (a) - (c) is drawing showing the manufacture approach of the substrate of the operation gestalt 3.

[Drawing 9] (a) - (c) is drawing showing the manufacture approach of the substrate of the operation gestalt 4.

[Drawing 10] (a) - (c) is drawing showing the manufacture approach of the substrate of the operation gestalt 5.

[Drawing 11] (a) - (d) is drawing showing the manufacture approach of the substrate of the operation gestalt 6.

[Drawing 12] (a) - (d) is drawing showing the manufacture approach of the substrate of the operation gestalt 7.

[Drawing 13] (a) - (b) is drawing showing the manufacture approach of the substrate of the operation gestalt 8.

[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
 [Section partition] The 2nd partition of the 7th section
 [Publication date] February 28, Heisei 15 (2003. 2.28)

[Publication No.] JP,11-330666,A
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 [Annual volume number] Open patent official report 11-3307
 [Application number] Japanese Patent Application No. 10-132446
 [The 7th edition of International Patent Classification]

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 B05D 1/32
 C23C 26/00

[FI]

H05K 3/00 A
 B05D 1/32 Z
 C23C 26/00 L

[Procedure revision]
 [Filing Date] November 20, Heisei 14 (2002. 11.20)
 [Procedure amendment 1]
 [Document to be Amended] Specification
 [Item(s) to be Amended] The name of invention
 [Method of Amendment] Modification
 [Proposed Amendment]
 [Title of the Invention] The manufacture approach of a substrate
 [Procedure amendment 2]
 [Document to be Amended] Specification
 [Item(s) to be Amended] Claim
 [Method of Amendment] Modification
 [Proposed Amendment]
 [Claim(s)]
 [Claim 1] It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,
 The process which forms a metal layer with a predetermined metal on the pedestal which shows compatibility to said fluid,
 The process which supplies energy to said compatibility field and removes said metal layer so that the

compatibility field which has compatibility to said fluid in the pattern formation field which forms said patternized thin film may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned,

The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 2] It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which forms a metal layer with a predetermined metal on the pedestal which shows non-compatibility to said fluid,

The process which supplies energy to fields other than the pattern formation field which forms said patternized thin film, and removes said metal layer,

The process which supplies energy to said non-compatibility field, and removes said metal layer so that the compatibility field which has compatibility to said fluid in said pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned,

The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 3] Said sulfur compound is the manufacture approach of a substrate given in any 1 term of claim 1 equipped with a property opposite to said pedestal front face, or claim 2 about the compatibility over said fluid.

[Claim 4] It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the non-compatibility field concerned with a wrap mesh mask so that the compatibility field which covers fields other than the pattern formation field which forms said patternized thin film on the pedestal which shows non-compatibility to said fluid, and is affinitive to said fluid in the pattern formation field concerned may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned,

The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Claim 5] It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the compatibility field concerned with a wrap mesh mask so that the compatibility field which is affinitive to said fluid may be arranged according to a predetermined regulation in the pattern formation field which forms said patternized thin film on the pedestal which shows compatibility to said fluid between the non-compatibility fields which do not have compatibility to the fluid concerned,

The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Translation done.]

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3. In the drawings, any words are not translated.

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
 [Section partition] The 2nd partition of the 7th section
 [Publication date] March 3, Heisei 17 (2005. 3.3)

[Publication No.] JP,11-330666,A
 [Date of Publication] November 30, Heisei 11 (1999. 11.30)
 [Application number] Japanese Patent Application No. 10-132446
 [The 7th edition of International Patent Classification]

H05K 3/00
 B05D 1/32
 C23C 26/00

[FI]

H05K	3/00	A
B05D	1/32	Z
C23C	26/00	L

[Procedure revision]
 [Filing Date] March 29, Heisei 16 (2004. 3.29)
 [Procedure amendment 1]
 [Document to be Amended] Specification
 [Item(s) to be Amended] Claim
 [Method of Amendment] Modification
 [The contents of amendment]
 [Claim(s)]
 [Claim 1]

It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which forms a metal layer with a predetermined metal on the pedestal which shows compatibility to said fluid,

The process which supplies energy to the field which arranges the compatibility field which has compatibility to said fluid in the pattern formation field which forms said patternized thin film, and removes said metal layer,

The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 2]

It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid

was made to adhere and was patternized,

The process which forms a metal layer with a predetermined metal on the pedestal which shows non-compatibility to said fluid,

The process which supplies energy to fields other than the pattern formation field which forms said patternized thin film, and removes said metal layer,

The process which supplies energy to the field which arranges the non-compatibility field which does not have compatibility to said fluid into the pattern formation field which forms said patternized thin film, and removes said metal layer,

The manufacture approach of the substrate characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Claim 3]

Said sulfur compound is the manufacture approach of a substrate given in any 1 term of claim 1 equipped with a property opposite to said pedestal front face, or claim 2 about the compatibility over said fluid.

[Claim 4]

It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the non-compatibility field which covers fields other than the pattern formation field which forms said patternized thin film on the pedestal which shows non-compatibility to said fluid, and does not have compatibility to said fluid in the pattern formation field concerned to the wrap with a mesh mask,

The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Claim 5]

It is the manufacture approach of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the compatibility field which is affinitive to said fluid to the wrap with a mesh mask in the pattern formation field which forms said patternized thin film on the pedestal which shows compatibility to said fluid,

The manufacture approach of the substrate characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0011

[Method of Amendment] Modification

[The contents of amendment]

[0011]

Moreover, other invention which solves the 2nd technical problem of the above is the manufacture approaches of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which forms a metal layer with a predetermined metal on the pedestal which shows compatibility to said fluid,

The process which supplies energy to the field which arranges the compatibility field which has compatibility to said fluid in the pattern formation field which forms said patternized thin film, and removes said metal layer,

It is characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

Moreover, other invention which solves the 2nd technical problem of the above is the manufacture approaches of the substrate for forming the thin film which the predetermined fluid was made to adhere

and was patternized,

The process which forms a metal layer with a predetermined metal on the pedestal which shows non-compatibility to said fluid,

The process which supplies energy to fields other than the pattern formation field which forms said patternized thin film, and removes said metal layer,

The process which supplies energy to the field which arranges the non-compatibility field which does not have compatibility to said fluid into the pattern formation field which forms said patternized thin film, and removes said metal layer,

It is characterized by having the process to which said metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

Moreover, other invention which solves the 2nd technical problem of the above is the approaches of manufacturing the substrate for forming the film which the predetermined fluid was made adhering and was patternized,

a) The process which forms a metal layer with a predetermined metal on a pedestal,

b) The process which supplies energy to fields other than the pattern formation field which forms the patternized film, and removes a metal layer,

c) The process which supplies energy along the non-compatibility field concerned, and removes the metal layer of the non-compatibility field concerned so that the compatibility field which has

compatibility to a fluid in a pattern formation field may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned,

d) It is the manufacture approach of the substrate characterized by having the process to which a metal is immersed in the mixed liquor containing a sulfur compound in the pedestal removed alternatively.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0014

[Method of Amendment] Modification

[The contents of amendment]

[0014]

Other invention which solves the 2nd technical problem of the above further again is the manufacture approaches of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the non-compatibility field which covers fields other than the pattern formation field which forms said patternized thin film on the pedestal which shows non-compatibility to said fluid, and does not have compatibility to said fluid in the pattern formation field concerned to the wrap with a mesh mask,

It is characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

Other invention which solves the 2nd technical problem of the above further again is the manufacture approaches of the substrate for forming the thin film which the predetermined fluid was made to adhere and was patternized,

The process which carries out the mask of the compatibility field which is affinitive to said fluid to the wrap with a mesh mask in the pattern formation field which forms said patternized thin film on the pedestal which shows compatibility to said fluid,

It is characterized by equipping the pedestal to which said mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

Other invention which solves the 2nd technical problem of the above further again is the manufacture approaches of the substrate for forming the film which the predetermined fluid was made to adhere and was patternized,

a) The process which carries out the mask of the non-compatibility field concerned with a wrap mesh mask so that the compatibility field which covers fields other than the pattern formation field which forms the patternized film, and is in the pattern formation field concerned, and is affinitive to a fluid

may be arranged according to a predetermined regulation between the non-compatibility fields which do not have compatibility to the fluid concerned,

b) It is the manufacture approach of the substrate characterized by equipping the pedestal to which the mesh mask was carried out with the process which irradiates ultraviolet rays and carries out reforming processing of the front face.

[Translation done.]

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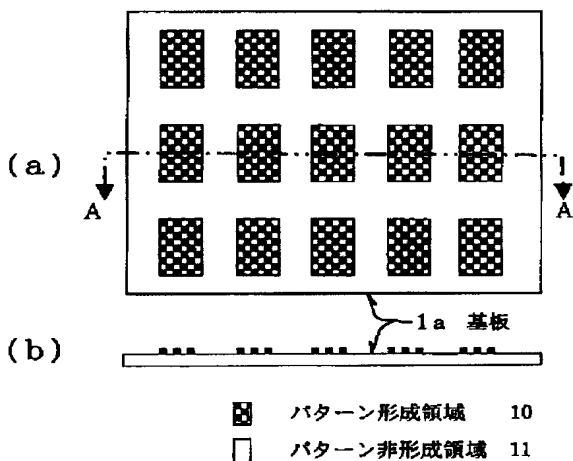
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(54) 【発明の名称】 特定パターン形成用基板およびその製造方法

(57) 【要約】

【課題】 一定面積のパターン形成領域に流動体を適量付着可能とした基板の提供。

【解決手段】 所定の流動体を付着させてパターン化された膜を形成するための基板である。特にこの基板は、膜を形成するために特定形状にパターン化されたパターン形成領域(10)を備える。そしてこのパターン形成領域(10)は、流動体に対し親和性のある親和性領域(110)が流動体に対し親和性のない非親和性領域(111)の間で所定の規則にしたがって配置されて構成されている。流動体を広がりすぎたり分断したりすることなく、必要な領域に均一に付着させ均一な薄膜を形成することができる。



【特許請求の範囲】

【請求項1】 所定の流動体を付着させてパターン化された薄膜を形成するための基板であって、前記薄膜を形成するための特定形状にパターン化されたパターン形成領域を備え、前記パターン形成領域は、前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されて構成されていることを特徴とする特定パターン形成用基板。

【請求項2】 前記パターン形成領域が複数一定の規則で配置されて構成されている請求項1に記載の特定パターン形成用基板。

【請求項3】 前記パターン形成領域が一定の図形形状に形成されて構成されている請求項1に記載の特定パターン形成用基板。

【請求項4】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性を示す基台上にパラフィンを塗布してパラフィン層を形成する工程と、前記パターン化された膜を形成するパターン形成領域内において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記親和性領域にエネルギーを供給し前記パラフィン層を除去する工程と、を備えたことを特徴とする基板の製造方法。

【請求項5】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し非親和性を示す基台上にパラフィンを塗布してパラフィン層を形成する工程と、前記パターン化された薄膜を形成するパターン形成領域内において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記非親和性領域にエネルギーを供給し前記パラフィン層を除去する工程と、パターン化された薄膜を形成しないパターン非形成領域にエネルギーを供給し、前記パラフィン層を除去する工程と、を備えたことを特徴とする基板の製造方法。

【請求項6】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性を示す基台上に所定の金属により金属層を形成する工程と、前記パターン化された薄膜を形成するパターン形成領域内において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記親和性領域にエネルギーを供給し前記金属層を除去する工程と、前記金属が選択的に除去された基台を、硫黄化合物を含む混合液に浸漬する工程と、を備えたことを特徴とする基板の製造方法。

【請求項7】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し非親和性を示す基台上に所定の金属により金属層を形成する工程と、前記パターン化された薄膜を形成するパターン形成領域以外の領域にエネルギーを供給し前記金属層を除去する工程と、前記パターン形成領域内において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記非親和性領域にエネルギーを供給し前記金属層を除去する工程と、前記金属が選択的に除去された基台を、硫黄化合物を含む混合液に浸漬する工程と、を備えたことを特徴とする基板の製造方法。

【請求項8】 前記硫黄化合物は、前記流動体に対する親和性に関し、前記基台表面と反対の性質を備える請求項6または請求項7のいずれか一項に記載の基板の製造方法。

【請求項9】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対して非親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域以外の領域を覆いかつ当該パターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記非親和性領域を覆うメッシュマスクでマスクする工程と、前記メッシュマスクがされた基台をプラズマ加工する工程と、前記プラズマ加工により励起された基台表面を改質処理する工程と、を備えることを特徴とする基板の製造方法。

【請求項10】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対して親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように前記親和性領域を覆うメッシュマスクでマスクする工程と、前記メッシュマスクがされた基台をプラズマ加工する工程と、前記プラズマ加工により励起された基台表面を改質処理する工程と、を備えることを特徴とする基板の製造方法。

【請求項11】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し非親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域以外

の領域を覆いかつ当該パターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域を覆うメッシュマスクでマスクする工程と、

前記メッシュマスクがされた基台に紫外線を照射して表面を改質処理する工程と、を備えることを特徴とする基板の製造方法。

【請求項12】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域において、前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該親和性領域を覆うメッシュマスクでマスクする工程と、

前記メッシュマスクがされた基台に紫外線を照射して表面を改質処理する工程と、を備えることを特徴とする基板の製造方法。

【請求項13】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性のない表面を備えた基台上に前記流動体に対し親和性のある薄膜材料で薄膜を形成する工程と、

前記パターン化された薄膜を形成するためのパターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるようにフォトレジストを設ける工程と、

前記フォトレジストが形成された基台をエッチングし前記フォトレジストが設けられた領域以外の領域をエッチングする工程と、を備えることを特徴とする基板の製造方法。

【請求項14】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性のある表面を備えた基台上に前記流動体に対し親和性のない薄膜材料で薄膜を形成する工程と、

前記パターン化された薄膜を形成するためのパターン形成領域以外の領域を覆い、かつ当該パターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域を覆うフォトレジストを設ける工程と、

前記フォトレジストが形成された基台をエッチングし前記フォトレジストが設けられた領域以外の領域をエッチングする工程と、を備えることを特徴とする基板の製造方法。

【請求項15】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、

前記流動体に対して非親和性を示す基台全面に電荷を与える工程と、

前記パターン化された薄膜を形成するパターン形成領域以外の領域にエネルギーを与えて電荷を消滅させる工程と、

前記パターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域の電荷を消滅させる工程と、電荷が消滅しなかった親和性領域に所定の物質を結合させる工程と、を備える基板の製造方法。

【請求項16】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対して親和性を示す基台全面に電荷を与える工程と、

前記パターン化された薄膜を形成するパターン形成領域において前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該親和性領域の電荷を消滅させる工程と、

電荷が消滅しなかった非親和性領域に所定の物質を結合させる工程と、を備える基板の製造方法。

【請求項17】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し非親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域中の前記流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該親和性領域に親和性膜を印刷する工程を備えることを特徴とする基板の製造方法。

【請求項18】 所定の流動体を付着させてパターン化された薄膜を形成するための基板の製造方法であって、前記流動体に対し親和性を示す基台上において、前記パターン化された薄膜を形成するパターン形成領域以外の領域と、当該パターン形成領域中の前記流動体に対し親和性を示す親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように配置された親和性領域とに、非親和性膜を印刷する工程を備えることを特徴とする基板の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、ユニバーサル基板の変形に係り、特に、液相材料を一定のパターンで付着させるのに適する基板の改良に関する。

【0002】

【従来の技術】従来、ユニバーサル基板または万能基板とよばれる基板があった。この基板は半田が付着しやすい斑点状の銅膜領域を規則的に配置したものであった。このユニバーサル基板では、基板上の任意の位置に半田

等で部品を固定することが可能となる。各部品の間では銅膜領域に連続的に半田ごてで半田を盛って配線したりリード線を介して他の部品と接続したりしていた。

【0003】

【発明が解決しようとする課題】ところで一定の面積を有するパターンの形状に薄膜を形成するためには、ある程度の量の流動体をパターン形成領域全体に均一に付着させなければならない。しかし上記ユニバーサル基板はこのような用途に向いていなかった。

【0004】このため、このような一定量の流動体を一定面積のパターン形成領域に付着させるためには、当然ながらパターン形成領域から流動体流れ出さないようにパターン形成領域の外周に沿ってバンク（仕切部材）を形成し、固化するまでパターン領域から流動体流れ出さないようにする必要があった。しかしながら、バンクを形成する薄膜形成方法では、バンク形成の手間がかかったり、バンクのために基板表面に過剰に起伏が生じたり、基板面と流動体の双方になじみやすいバンクの材料を選択しなければならなかったりと不都合が多かった。

【0005】この不都合を解決するために、本願発明者は、一定形状のパターン領域内に仕切部材等を用いることなくある程度の量の流動体を均一に付着させることが可能な特定パターンの形成方法に想到した。

【0006】

【課題を解決するための手段】すなわち、本発明の第1の課題は、流動体に対し親和性のある領域と親和性のない領域とを規則的に配置することにより、一定面積のパターン形成領域に流動体を適量付着可能とする基板を提供することである。

【0007】本発明の第2の課題は、流動体に対し親和性のある領域と親和性のない領域とを規則的に配置することにより、一定面積のパターン形成領域に流動体を適量付着可能とする基板の製造方法を提供することである。

【0008】上記第1の課題を解決する発明は、所定の流動体を付着させてパターン化された膜を形成するための基板であって、膜を形成するために特定形状にパターン化されたパターン形成領域を備える。そしてパターン形成領域は、流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されて構成されていることを特徴とする特定パターン形成用基板である。例えば本基板は、パターン形成領域が複数一定の規則で配置されて構成されている。またはパターン形成領域が一定の図形形状に形成されて構成されている。

【0009】ここで「流動体」とは、インクのみならず、工業的用途に用いることができ、ノズルから吐出可能な粘度を備えた媒体である。水性であると油性であると問わない。また混合物がコロイド状に混入していて

もよい。また「親和性がある」とは流動体に対する接触角が相対的に小さいことをいい、「親和性がない」とは、流動体に対する相対的に接触角が大きいことをいう。この両表現は、流動体に対する膜の挙動を明らかにするために、便宜上対比して用いられるものである。上記「親和性領域」または「非親和性領域」の配列は散点模様、モザイク模様、縞模様など任意の模様を形成するように配置される。個々の領域の形状は、円形でも三角形や四角形等の多角形でも線状でもよい。個々の領域の大きさも制限されない。

【0010】上記第2の課題を解決する発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) 基台上にパラフィン塗布してパラフィン層を形成する工程と、

b) パターン化された膜を形成するパターン形成領域内において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該親和性領域に沿ってエネルギーを供給し当該親和性領域のパラフィン層を除去する工程と、を備えたことを特徴とする基板の製造方法である。

【0011】また上記第2の課題を解決する他の発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) 基台上に所定の金属により金属層を形成する工程と、

b) パターン化された膜を形成するパターン形成領域以外の領域にエネルギーを供給し金属層を除去する工程と、

c) パターン形成領域内において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域に沿ってエネルギーを供給し当該非親和性領域の金属層を除去する工程と、

d) 金属が選択的に除去された基台を硫黄化合物を含む混合液に浸漬する工程と、を備えたことを特徴とする基板の製造方法である。

【0012】ここで上記硫黄化合物は、流動体に対する親和性に関し、基台表面と反対の性質を備えることが好ましい。

【0013】さらに上記第2の課題を解決する他の発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) パターン化された膜を形成するパターン形成領域以外の領域を覆いかつ当該パターン形成領域において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域を覆うメッシュマスクでマスクする工程と、

b) メッシュマスクがされた基台をプラズマ加工する工程と、

c) プラズマ加工により解離を生じた分子を改質処理する工程と、を備えることを特徴とする基板の製造方法である。

【0014】さらにまた上記第2の課題を解決する他の発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) パターン化された膜を形成するパターン形成領域以外の領域を覆いかつ当該パターン形成領域において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域を覆うメッシュマスクでマスクする工程と、

b) メッシュマスクがされた基台に紫外線を照射して表面を改質処理する工程と、を備えることを特徴とする基板の製造方法である。

【0015】さらに上記第2の課題を解決する他の発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) 流動体に対し親和性のない表面を備えた基台上に流動体に対し親和性のある材料で薄膜を形成する工程と、

b) パターン化された膜を形成するパターン形成領域において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該親和性領域を覆うフォトレジストを設ける工程と、

c) フォトレジストが形成された基台をエッチングしフォトレジストが設けられた領域以外の領域をエッチングする工程と、を備えることを特徴とする基板の製造方法である。

【0016】さらに上記第2の課題を解決する発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、

a) 基台全面に電荷を与える工程と、

b) パターン化された膜を形成するパターン形成領域以外の領域にエネルギーを与えて電荷を消滅させる工程と、

c) パターン形成領域において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるように当該非親和性領域の電荷を消滅させる工程と、

d) 電荷が消滅しなかった親和性領域に所定の物質を結合させる工程と、を備える基板の製造方法である。

【0017】さらに上記第2の課題を解決する発明は、所定の流動体を付着させてパターン化された膜を形成するための基板の製造方法であって、パターン化された膜を形成するパターン形成領域において流動体に対し親和性のある親和性領域が当該流動体に対し親和性のない非親和性領域の間で所定の規則にしたがって配置されるよ

うに当該親和性領域に親和性膜を形成する工程を備えることを特徴とする基板の製造方法である。

【0018】ここで、上記基板に対して流動体によりパターン化された膜を形成するためには、インクジェット方式によることが好ましい。まずインクジェット式記録ヘッドの流動体を充填可能に構成されたキャビティに対し膜の材料となる流動体を供給する。そして当該キャビティに体積変化を生じさせることが可能に構成された圧電体素子に対して電圧を印加し、パターン形成領域全面に万遍なく流動体が付着するようにそのノズルから流動体の液滴を吐出させる。

【0019】

【発明の実施の形態】以下、本発明を実施するための形態を、図面を参照して説明する。

（実施形態1）本発明の実施形態1は、特定パターンの形成に適する基板構造に関する。図1に本実施形態1の基板の外形図を示す。図1（a）は平面図であり、図1（b）は図1（a）を切断面AAから見た図である。図1（a）に示すように、本実施形態1の基板1aは、基台のパターン形成面に、パターン形成領域10がパターン非形成領域11の間にパターン化されて配置されている。パターン形成領域10は、所定の流動体を付着させて薄膜を形成させるための領域である。パターン非形成領域11は、前記薄膜を形成させない領域である。パターン非形成領域11は、基台が流動体に対して非親和性を示す材料で形成されている場合には基台表面そのものが表れている領域となる。

【0020】またパターン形成領域10は、流動体に対して親和性を示す親和性領域110と流動体に対して非親和性を示す非親和性領域111とが交互に配置されて構成される。親和性領域110と非親和性領域111とを交互に配置することで、適度な量の流動体を付着させることができるからである。ただしパターン形成領域全体を親和性領域110のみで構成してもよい。

【0021】親和性領域110は、図2（a）のように方形領域が互いに接しているパターンや、図2（b）のように方形領域が一定の間隔で配置されているパターンが利用できる。また図2（c）のように円形領域が互いに接しているパターンや、図2（d）のように円形領域が一定の間隔で配置されているパターンも利用できる。さらに図2（e）に示すように三角形領域が互いに接しているパターンや、図2（f）のように三角形領域が一定の間隔で配置されているパターンも利用できる。さらに、図2（g）のように平行線からなるパターンが考えられる。これらの他任意の多角形や不規則な形状等が利用できる。

【0022】ここで親和性を示すか非親和性を示すかは、パターン形成対象である流動体がどのような性質を備えているかで決まる。例えば流動体が水のように極性分子を含むのであれば、極性基を備えた表面領域が親

和性を示し、極性基を備えない表面領域が非親和性を示す。逆に流動体が多く有有機媒体のように極性分子を含まないものであれば、極性基を備えた表面領域が非親和性を示し、極性基を備えない表面領域が親和性を示す。流動体を何にするかは、薄膜をどのような材料で形成するのかによって定められる。本実施形態では、パターン非形成領域11は流動体に対して非親和性を示すように基台の材料が定められる。パターン形成領域10の非親和性領域111は、パターン非形成領域11と同様に基台の表面が露出している部分である。

【0023】表1に、本実施形態のパターン非形成領域11および非親和性領域111として使用可能な材料と、親和性領域110として使用可能な材料の例を示す。

【0024】

【表1】

構成要素	流動体が極性分子を含む場合	流動体が極性分子含まない場合
パターン非形成領域11、非親和性領域111	ベークライト、ポリエステル、ポリエチレン、テフロン、PMMA、ポリプロピレン、塩化ビニル	ポリビニルアルコール、ポリアクリル酸、ナイロン、ガラス
親和性領域110	OH基を持つ硫黄化合物膜、OH、COOH、NH ₂ 基等を持つシランカップリング剤	アルキル基等を持つ硫黄化合物、有機化合物膜(パラフィン等)

【0025】パターン形成領域10の形状、配置、大きさ等は用途に応じて任意に設定できる。図1(a)に示したパターン形成領域10は方形をしており規則的に配置されている。もちろん、パターン形成領域の形状としては方形の他に多角形や円形、不規則な外形をしていてもよい。また図3に示すように、パターン形成領域10を文字や記号、その他の図形に形成してもよい。流動体を文字や記号等の形状に付着させて薄膜化させたい場合に利用できる。またパターン形成領域の配置は、規則的なものである必要はなく、不規則なものであってもよい。パターン形成領域の大きさは、特に制限を設けることなく、種々に拡大縮小が可能である。

【0026】(作用)図5および図6に、従来の基板に対し流動体を付着させた場合の液滴付着の様子を示す。図5(a)は、基台100に液滴12を複数滴吐出した場合の断面図であり、図6(a)はその平面図である。本実施形態のようにパターン形成領域を形成していない基板に液滴12を連続して吐出すると、図5(a)のように着弾した液滴が表面張力により広がって、隣接する液滴12が連結する。このとき液滴12の広がりを阻止する境界が何もないので、図6(a)に示すように、各液滴の輪郭が着弾したときの広がりを超えて広がってしまう。流動体の溶媒成分が少ない場合、この輪郭が広が

ったまま固化するので微細なパターンを形成することは困難となる。溶媒成分が多い場合、液滴を乾燥させると液滴中の溶媒成分が除去され、各液滴は着弾した位置で収縮していく。付着位置に制限がないので、図5(b)および図6(b)に示すように、最初連結していた液滴12が分離され、島12bとなる。島12bとなって分離してしまうのでは、パターンとして役に立たない。

【0027】図4を参照して本実施形態のパターン形成領域10における基板1aの作用を説明する。図4

(a)は、図2(a)のパターンに流動体の液滴を付着させたときの基板上における液滴の形を示す。図4

(b)は、図2(g)のパターンに流動体の液滴を付着させたときの基板上における液滴の形を示す。図4

(a)(b)におけるいずれのパターンの場合にも、インクジェット方式によってラインL3に沿って液滴を付着させたものとする。

【0028】図4(a)に示すように、基板上に着弾した液滴12は親和性領域110では十分に広がる。しかし非親和性領域111からは排除され、表面張力にしたがって隣接する親和性領域110に引き込まれる。したがって表面張力が働いて引き込まれた後は図4(a)に示すように、親和性領域110のみに液滴12が付着する。ヘッドからの液滴の吐出方向が多少ずれても、ラインL2からL4までの一定の幅に着弾すれば、付着する液滴12は常にラインL2からL4の間の親和性領域110に乗る。親和性領域110は互いに分離しているか一点で接しているだけなので、直接着弾しない限り、一つの親和性領域110に乗った液滴12が隣接する親和性領域110に侵入することがない。液滴12が乗っている親和性領域110の隣には、必ず液滴12が乗っている親和性領域110が、接しているかわずかに離れているかしているので、液滴12同士が表面張力で互いに連結される。したがって液滴12が着弾した軌跡に沿ってつながり、パターンが連続する。液滴12が乗った親和性領域110では液滴が満ちた状態となっているので、この液滴が乾燥しても連結していた隣接する液滴と分離されることはない。

【0029】以上から判るように、本実施形態のように形成したパターン形成領域10では、流動体を付着させた領域では十分に流動体広がるがそれ以上に広がることできない。つまり適量の流動体を付着させることができる。親和性領域110のパターン配置は、個々のパターンが互いに点接触する程度が好ましい。個々のパターンが接触し完全に繋がると、親和性領域境界における表面張力の阻止ができず、隣接する親和性領域に無制限に液滴が侵入するおそれがあるからである。逆に点状パターンが離れ過ぎると、液滴の連続性が阻害され、液滴パターンの分離を起こすからである。

【0030】一方、図4(b)の線状パターンでは、液滴12がラインL3に沿って着弾しており、隣接する液

滴12と連結されている。この線状パターンでは、液滴12がラインL2からL4の間に着弾する限り、ラインL3を中心する液滴の繋がりに吸収され、ラインL2からL4の幅より液滴が広がらない。またラインL3は連続しているので、重なり合うように液滴12が着弾する限り、液滴パターンが分断されることはない。

【0031】本実施形態の基板1を使用してパターンを形成する場合には、流動体を基板面に付着させることのできるあらゆる方法を適用可能である。例えばインクジェット方式で付着させる他、スピンコート、ロールコート、ダイコート、スプレーコート等各種の塗布法を適用可能である。本実施形態の基板によれば、適度な液量の流動体を付着可能に構成されているので、パターン形成領域10には満遍なく流動体が付着するがパターン非形成領域11には付着することがなく、パターンの通りに流動体を付着させることができる。流動体を付着させたら熱処理等を行って流動体から溶媒を蒸発させ薄膜化させることにより、パターン形成領域の通りに薄膜を形成可能である。

【0032】上記したように本実施形態1によれば、パターン形成領域には適量の流動体を付着させることができ、それ以外のパターン非形成領域には流動体が付着しないので、パターン形成領域の通りに薄膜を形成可能である。

【0033】(実施形態2)本発明の実施形態2は、パラフィン等の有機物質を用いた上記実施形態1で説明した基板の製造方法に関する。図7を参照して本実施形態の製造方法を説明する。図7は本発明の基板の製造工程断面図である。

【0034】パラフィン層形成工程(図7(a))：パラフィン層形成工程は、基台100にパラフィンを塗布しパラフィン層101を形成する工程である。基台100は、流動体に応じて流動体に対し親水性にするか非親水性(疎水性、親油性)にするかを選択する。流動体が極性分子を含まない場合には、基台100を親水性にする。流動体が極性分子を含む場合には、基台100を疎水性の材料に選ぶ。図7では、流動体が極性分子を含まない場合のパターン形成を示し、基台100としては親水性のものを使用している。例えば、基台100は、ポリ4-ビニルピロリドン、ポリエチレンオキシド、ポリビニルアルコール、セルロース、ポリ酢酸ビニル等を使用する。パラフィン層101の形成には、ロールコート法、スピンコート法、スプレーコート法、ダイコート法、バーコート法等の各種塗布法、各種印刷法、転写法等の方法を適用可能である。

【0035】エネルギー供給工程(図7(b))：マスク形成工程は、流動体が極性分子を含まない場合、パラフィン層101のうちパターン非形成領域11およびパターン形成領域10中の非親和性領域111にエネ

ギーを供給してパラフィンを蒸発させる工程である。エネルギーとしては、光、熱または光及び熱の三者が考えられるが、特定の微細領域のパラフィンを除去するためにレーザ光を用いるのが好ましい。例えば、短波長のレーザ光を照射し、パラフィンを蒸発させる。

【0036】以上の製造工程により、パターン形成領域10の親和性領域110にパラフィン層101が残される。この基板に極性分子を含まない流動体を付着させると、パターン形成領域10にのみ付着する。なお、付着させる流動体が極性分子を含む場合には、パターン形成領域10中の親和性領域110にのみエネルギーを供給してパラフィンを除去する。これにより親和性領域110にのみ極性分子を含む流動体を付着させることができる。

【0037】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、パラフィンがパターン非形成領域11およびパターン形成領域10の非親和性領域111に残るように製造する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、パラフィンがパターン形成領域10の親和性領域110に残されるように製造する。

【0038】(実施形態3)本発明の実施形態3は、上記実施形態1で説明した基板の製造方法に関する。特に本形態では硫黄化合物の自己集合化単分子膜を利用する。

【0039】本実施形態では、基台に金属層を設けそれを硫黄化合物を含む溶解液に浸漬して自己集合化単分子膜を形成する。硫黄化合物は、メルカプト基を備える分子で構成される。この硫黄化合物を、1~10mMのエタノール溶液に溶解する。この溶液に金の膜を形成した基板を浸漬し、室温で1時間程度放置すると、硫黄化合物が金の膜の表面に自発的に集合してくる。そして金の原子と硫黄原子とが共有結合的に結合し、金の表面に二次元的に硫黄分子の単分子膜が形成される。この膜の厚さは、硫黄化合物の分子量にもよるが、10~50オングストローム程度である。硫黄化合物の組成を調整することにより、自己集合化単分子膜を流動体に対し親和性にしたり非親和性にしたり自由に設定できる。

【0040】硫黄化合物としてはチオール化合物が好ましい。ここでチオール化合物とは、メルカプト基(-SH; mercapt group)を持つ有機化合物(R-SH; Rはアルキル基(alkyl group)等の炭化水素基)の総称をいう。

【0041】表2に、流動体が極性分子を含む場合と極性分子を含まない場合とに分けて、流動体に親和性のあるチオール化合物の代表的な組成を示す。n、mは自然数とする。

【0042】

【表2】

対象	流動体が極性分子を含む	流動体が極性分子含まず
硫黄化合物の組成	OH基またはCO ₂ H基を有する硫黄化合物。H O ₂ C(CH ₂) _n SH、 HO(CH ₂) _n SH等	C _n H _{2n+2} SHで表わされる直鎖 のアルカン(alkane)チオール、 CF ₃ (CF ₂) _m (CH ₂) _n SH で表わされる弗素系の化合物
基板の組成	ポリビニルアルコール、 ポリアクリル酸、ナイロ ン、ガラス	ペークライト、ポリエステル、ポ リエチレン、テフロン、PMM A、ポリプロピレン、塩化ビニル

【0043】表2から判るように、硫黄化合物単分子膜を極性分子に対して親和性にしたり非極性分子に対して親和性にしたりは組成を変えることで自由に設定できる。図8に、本実施形態3における基板の製造方法の製造工程断面図を示す。

【0044】金属層形成工程(図8(a))：金属層形成工程は、基台100上に金属層102を形成する工程である。基台100は、流動体に応じて流動体に対し親水性にするか非親水性(疎水性、親油性)にするかを選択する。流動体が極性分子を含まない場合には、基台100を親水性にする。流動体が極性分子を含む場合には、基台100を疎水性の材料に選ぶ。金属層102としては、化学的・物理的な安定性から金(Au)が好ましい。金の他、硫黄化合物を化学的に吸着する銀(Ag)、銅(Cu)、インジウム(In)、ガリウム-砒素(Ga-As)等の金属であってもよい。金属層102の形成方法としては、湿式メッキ、真空蒸着法、真空スパッタ法等の公知の技術が使用できる。ただし金属の薄膜を一定の厚さで均一に形成できる成膜法であれば、その種類に特に限定されるものではない。金属層の役割は、硫黄化合物層を固定することであるため、金属層自体は極めて薄くてもよい。そのため500～2000オングストローム程度の厚みに形成すればよい。

【0045】なお、基板100によっては金属層102と基台100との密着性が悪くなる。このような場合には金属層102と基台100との密着性を向上させるために、基台と金属との間に中間層を形成する。中間層は、基台100と金属層102との間の結合力を強める素材、例えば、ニッケル(Ni)、クロム(Cr)、タンタル(Ta)ノズルれか、あるいはそれらの合金(Ni-Cr等)であることが好ましい。中間層を設ければ、基台100と金属層102との結合力が増し、機械的な摩擦に対し、硫黄化合物層が剥離し難くなる。金属層102の下に中間層を形成する場合には、例えばCrを100～300オングストロームの厚さで真空スパッタ法、またはイオンプレーティング法により形成する。

【0046】パターン形成工程(図8(b))：パターン形成工程は、基台100上に形成した金属層102のうち一部にエネルギーを与えて金属を蒸発させる。流動体が極性分子を含み基台100が疎水性を示す場合、または流動体が極性分子を含まず基台100が親水性を示す場合には、パターン非形成領域11およびパターン形成領域10中の非親和性領域111にエネルギーを供給する。流動体が極性分子を含まず基台100が疎水性を示す場合、または流動体が極性分子を含み基台100が親水性を示す場合には、パターン形成領域10中の親和性領域110にのみエネルギーを供給する。エネルギーとしては光が好ましく、特に短波長の高エネルギーを供給可能なレーザ光が好ましい。ピックアップ200を親和性領域または非親和性領域のパターンに合わせてレーザ光を射出させながら移動させる。レーザ光が照射された領域は、金属層102を形成する金属が蒸発するため、基台100が露出する。

【0047】硫黄化合物浸漬工程(図8(c))：硫黄化合物浸漬工程は、一部の金属が除去された金属層を含む基板を、硫黄化合物の溶解液に浸漬し、自己集合化単分子膜103を形成する工程である。まず自己集合化単分子膜103に用いたい組成のチオール化合物をエタノールまたはイソプロピルアルコールのような有機溶剤に溶かした溶液を用意する。例えば流動体が極性分子を含み当該自己集合化単分子膜103を親和性領域110にしたい場合には、OH基またはCO₂H基を有する硫黄化合物を用いて親水性の硫黄化合物溶液を製造する。流動体が極性分子を含まず当該自己集合化単分子膜103を親和性領域110にしたい場合には、アルキル基を有する硫黄化合物を用いて疎水性の硫黄化合物溶液を製造する。そしてその溶液中に金属層102をパターンニングした基台100を浸漬する。浸漬条件は、溶液の硫黄化合物濃度が0.01mMで、溶液温度が常温から50℃程度、浸漬時間が5分から30分程度とする。浸漬処理の間、硫黄化合物層の形成を均一に行うべく、溶液の攪拌あるいは循環を行う。

【0048】金属表面の清浄ささえ保てれば、硫黄分子が自ら自己集合化し単分子膜を形成するため、厳格な条件管理が不要な工程である。浸漬が終了するころには、金の表面にだけ強固な付着性を有する硫黄分子の単分子膜が形成される。

【0049】最後に基台表面に付着した溶解液を洗浄して除去する。金層以外の部分に付着した硫黄化合物分子は共有結合をしていないので、エチルアルコールによるリンス等、簡単な洗浄により除去される。

【0050】以上の工程により、自己集合化単分子膜103がパターン形成領域10中の親和性領域110に形成された基板1が製造される。

【0051】上記したように、本実施形態3によれば、硫黄化合物の自己集合化単分子膜を用いることにより、液相材料を安定してパターンに沿って付着させることのできる基板を製造できる。特に、硫黄化合物の自己集合化単分子膜は摩耗に強く、物理的、化学的耐性が高いので、工業用品である基板に適する。また硫黄化合物を選択すれば、基台の性質に応じて自由に自己集合化単分子膜を親水性にも非親水性にもできる。さらにレーザ光を用いれば、微細なパターンを形成できる。

【0052】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、非親和性を示す自己集合化単分子膜がパターン非形成領域11およびパターン形成領域10の非親和性領域111に残るように製造する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、親和性を示す自己集合化単分子膜がパターン形成領域10の親和性領域110に残るように製造する。

【0053】(実施形態4) 本発明の実施形態4は、プラズマ処理による実施形態1の基板の製造方法に関する。プラズマ処理は所定の気圧下で高電圧のグロー放電を行って基板の表面改質を行う方法である。ガラスやプラスチックのような絶縁性基板にプラズマ処理を行うと、基板表面に多量の未反応基と架橋層が発現する。これを大気または酸素雰囲気下にさらすと未反応基が酸化されてカルボニル基、水酸基を形成することができる。これらは極性基であるため極性分子を含む流動体に対し親和性がある。一方ガラスやプラスチックの多くは極性分子を含む流動体に対し非親和性を示す。したがって基板のパターン形成面を選択的にプラズマ処理することによって親和性領域および非親和性領域を生成可能である。本実施形態ではこの原理に基づき、マスクを施すことにより一部領域のみをプラズマ処理して、親和性領域と非親和性領域とを出現させる。

【0054】次に図9を参照して本実施形態4の基板の製造方法を説明する。

マスク形成工程(図9(a))： マスク形成工程は、基台100の上にマスク201を施す工程である。基台100としては、プラズマ照射によって未反応基が出現

しうる素材、所定のプラスチック、表面をテフロン加工されたガラス基板等を用いる。マスク201は、基台100上で疎水性にしたい領域のみマスクがかかるようにパターン形成される。例えば流動体として極性分子を含むものを用いる場合には、パターン非形成領域11およびパターン形成領域10中の非親和性領域111が露光されるようなマスクを設ける。マスクの材料としては、露光マスク、エマルションマスク、ハードマスク等種々のマスクが形成できる。露光マスクを使用する場合には、クロム、酸化クロム、シリコン、酸化シリコン、酸化膜などを、真空蒸着、スパッタリング、CVD法等で形成する。

【0055】プラズマ照射工程(図9(b))： プラズマ照射工程は、マスク201が施された基台100上にプラズマ照射202する工程である。プラズマ照射は、例えば $10^{-1} \sim 100$ Paのアルゴンガス中でネオントランスを用いて、数百ボルトから数千ボルトの電圧を印加しグロー放電させて行う。この他、ラジオ周波数帯の放電電源を用いて容量結合または誘電結合により放電プラズマを形成する方法、マイクロ波電力を導波管によって放電容器に供給して放電プラズマを形成させる方法等を適用可能である。

【0056】この処理により、プラズマ中に活性粒子としてイオン、電子、励起原子または分子およびラジカル等が発生し、基台100表面の高分子の分子構造が変化する。つまりプラズマ202が照射された部分に多量の未反応基や架橋層が出現する。

【0057】表面改質工程(図9(c))： 表面改質工程は、プラズマ処理された基台100表面を酸化し表面を改質する工程である。上記プラズマ処理によって未反応基や架橋層が出現した基台100を、大気または酸素雰囲気下にさらす。基台100表面の未反応基は酸化されて、水酸基やカルボニル基を生ずる。これら極性基は水に対して濡れやすい親水性を示す。一方マスクされプラズマ処理されなかった領域はプラスチックのままであり非親水性を示す。

【0058】したがってプラズマ処理された領域が親和性領域110となり、プラズマ処理されなかった領域が非親和性領域111またはパターン非形成領域11となる。

【0059】上記のように本実施形態4によれば、プラズマ処理により基台を構成する一部領域の分子構造を変更することで、非親水性の膜を親水性の膜に変更できるので、新たな層を形成することなく実施形態1の基板を提供することができる。分子レベルの組成が変更されるのでこの基板は安定である。

【0060】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、パターン非形成領域11およびパターン形成領域10の非親和性領域111にプラズマ照射されるように製造する。基台100が

流動体に対し非親和性を示す材料で形成されている場合には、パターン形成領域10の親和性領域110がプラズマ照射されるように製造する。

【0061】(実施形態5)本発明の実施形態5は、紫外線照射による実施形態1の基板の製造方法に関する。紫外線照射は、樹脂の表面改質手段として上記プラズマ処理と同様に用いることができる。基板がポリエステルやポリエチレンのような樹脂で形成されていたりこれら樹脂薄膜で覆われていたりすると、これら樹脂は極性のない有機高分子であるため、本来その表面は極性分子を含む流動体に対し非親和性に、極性分子を含まない流動体に対し親和性になる。ところがこの樹脂表面に紫外線を照射すると、プラズマ処理と同様に表面が活性化し、OH基やCOOH基が出現する。これらの基は極性基であるため極性分子を含む流動体に対して親和性を示すようになる。基板のパターン形成面のうちマスクで選択的に紫外線を照射させることで、親和性領域と非親和性領域を容易に形成することができる。

【0062】次に図10を参照して本実施形態5の基板の製造方法を説明する。

マスク形成工程(図10(a))：マスク形成工程は、基台100の上にマスク203を施す工程である。基台100としては、プラズマ照射によって未反応基が出現しうる素材、特にポリエステルやポリエチレンなどのプラスチック等を用いる。または表面にこれらプラスチックによる薄膜が形成されているガラス等の基板であってもよい。マスク203は、基台100上で疎水性にしたい領域のみマスクがかかるようにパターン形成される。例えば極性分子を含む流動体を用いる場合には、パターン形成領域10中の親和性領域110が露光され、それ以外の領域が覆われるようなマスクを設ける。マスクの材料としては、露光マスク、エマルジョンマスク、ハードマスク等種々のマスクが形成できる。露光マスクを使用する場合には、クロム、酸化クロム、シリコン、酸化シリコン、酸化膜などを、真空蒸着、スパッタリング、CVD法等で形成する。

【0063】紫外線照射工程(図10(b))：紫外線照射工程は、マスク203が施された基台100上に紫外線照射する工程である。紫外線照射には、例えば紫外線ランプを用いて行う。この処理により、紫外線が基台100表面の高分子にエネルギーを与えて分子を励起させ共有結合構造を変化させる。これによって紫外線204が照射された基台100の露光領域に多量の未反応基や架橋層が出現する。

【0064】表面改質工程(図10(c))：表面改質工程は、紫外線照射された基台100表面を酸化し表面を改質する工程である。上記紫外線照射によって未反応基や架橋層が出現した基台100を大気または酸素雰囲気下にさらすと、基台100表面の未反応基が酸化され、水酸基やカルボニル基が生ずる。これら極性基は極

性分子を含む水等の流動体に対して濡れやすい親和性(親水性)を示す。一方マスクされ露光されなかった領域はプラスチックのままの性質を示す。つまり極性分子を含む流動体に対し非親和性を示す。したがって紫外線照射された領域が親和性領域110となり、紫外線照射されなかった領域が非親和性領域111またはパターン非形成領域11となる。

【0065】上記のように本実施形態5によれば、紫外線照射により基台を構成する一部領域の分子構造を変更することで、非親水性の膜を親水性の膜に変更できるので、新たな層を形成することなく実施形態1の基板を提供することができる。分子レベルの組成が変更されるのでこの基板は安定である。

【0066】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、パターン非形成領域11およびパターン形成領域10の非親和性領域111に紫外線照射されるように製造する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、パターン形成領域10の親和性領域110が紫外線照射されるように製造する。

【0067】(実施形態6)本発明の実施形態6は、フォトリソグラフィ法を用いた実施形態1の基板の製造方法に関する。次に図11を参照して本実施形態6の基板の製造方法を説明する。以下の説明では基台100が流動体に対し非親和性を示し、フォトリソグラフィ法によって流動体に対し親和性を示す層をパターン形成領域10中の親和性領域110に形成していくものとする。ただし、基台100が流動体に対し親和性を示す場合には、フォトリソグラフィ法によってパターン非形成領域11およびパターン形成領域10中の非親和性領域111に、流動体に対し非親和性を示す層を形成することになる。

【0068】親和性膜形成工程(図11(a))：親和性膜形成工程は、基台表面に流動体に対し親和性を示す材料による薄膜104を形成する工程である。極性分子を含む流動体に対して親和性を示す材料としては、OH基、COOH基、NH₂基等を持つシランカップリング剤等が挙げられる。薄膜の形成方法としては、スピンコート法、ディップ法、公知の薄膜形成方法を適用可能である。薄膜104の厚みは、上記製造方法によりほぼ均一な厚みに形成できる程度の厚みを確保できれば十分である。

【0069】露光工程(図11(b))：露光工程は薄膜104の上にフォトレジスト105を塗布し、パターン形成に合わせたマスクを施した後、露光・現像してフォトレジスト105を残す工程である。フォトレジストとしては、PMMA、PBS、ポリイミド等の公知の材料を適用可能であり、エッチング方法および薄膜材料104との関係で定める。フォトレジスト105をスピンナー法、スプレー法、ロールコーター法、浸漬法等の

塗布法で塗布後、上記実施形態4または5で説明したものと同様のマスクを施して、フォトレジスト105を露光する。フォトレジストがポジ型の場合には、パターン形成領域10中の親和性領域110を覆うマスクを施す。フォトレジストがネガ型の場合には、パターン非形成領域11およびパターン形成領域10中の非親和性領域111を覆うマスクを施す。そしてマスク上から通常光または遠紫外線露光を行ってフォトレジストを露光する。

【0070】現像工程(図11(c))： 現像工程は、露光させたフォトレジスト105を現像してパターンに合わせたフォトレジストを残す工程である。スプレー法やディップ法等によって現像液を付着させて現像を行う。次いでリンス液を同様の方法で付着させて不要なフォトレジストの除去を行う。この処理により薄膜104上にはパターンに沿ったフォトレジスト105が残される。

【0071】エッチング工程(図11(d))： エッチング工程は、フォトレジスト105が残された薄膜104をエッチングして不要な薄膜104を除去する工程である。エッチング方法は、ウェットエッチングやドライエッチングのいずれも利用可能である。ウェットエッチングにおけるエッチング液またはドライエッチングにおけるエッチングガスとしては、被エッチング材料である薄膜104のエッチングに適したものが選択される。

【0072】以上の工程により、パターン形成領域10中の親和性領域110を除く領域の薄膜104が除去され、パターン形成領域10とパターン非形成領域11とが基台100表面に形成される。

【0073】上記したように本実施形態6によれば、薄膜パターン形成方法として頻繁に用いられているフォトリソグラフィ法を適用しても実施形態1の基板を製造することができる。

【0074】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、非親和性を示す薄膜がパターン非形成領域11およびパターン形成領域10の非親和性領域111に残るように製造する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、親和性を示す薄膜がパターン形成領域10の親和性領域110に残されるように製造する。

【0075】(実施形態7) 本発明の実施形態7が、基板に電荷を与えることによる実施形態1の基板の製造方法に関する。図12に本実施形態7における基板の製造工程断面図を示す。

電荷印加工程(図12(a))： 電荷印加工程は、基台100に電荷を生じさせる工程である。基台100としては帯電しやすい材料を用いる。例えば高分子材料では、ポリエチレンテレフタレートなどを用いることができる。その他レーザープリンターの感光体として用いられる、セレン系、Si:H系、CdS系、ZnO系等の無

機半導体や、PVK/Se、PVK-TNF、CGL/CTL、CTL/CGL、CTL(CGL)等を用いることも可能である。基台100表面に電荷106を印加するためにはレーザープリンタで用いられるコロナ帯電器等の電荷印加手段を用いる。基板表面にこのコロナ帯電器等を近づけて表面に様に帯電させる。具体的には直径50 μ m～100 μ mのタングステン線に6～8kVの直流高電圧を印加し、基台表面から8～10mm離してコロナ放電を行う。

【0076】脱チャージ工程(図12(b))： 脱チャージ工程は、様に帯電した基台100のパターン形成面に選択的にエネルギー206を印加して電荷106を部分的に逃す工程である。すなわち光エネルギー等が供給されることにより露光部では、光キャリアの生成と輸送が起こり、表面電荷が喪失し、表面に静電潜像が形成される。エネルギー供給源としてはレーザー光が好ましい。微細パターンに合わせた潜像の形成が行えるからである。その他、マスクを用いて紫外線等の光エネルギーを加えてもよい。脱チャージする領域は、上記のように基台100材料としてポリエチレンテレフタレートを用いた場合には、パターン非形成領域11およびパターン形成領域10中の非親和性領域111にする。脱チャージされた領域は定着工程において粉末材料が定着されず、基台100表面が露出したままとする。

【0077】付着工程(図12(d))： 付着工程は、脱チャージされなかった帯電領域に静電引力を利用して粉末材料207を付着させる工程である。粉末材料206としては、例えばレーザープリンタにおけるトナーのような材料をいい、静電力で付着させることが可能な材料を用いる。また、定着後には極性分子を含む流動体に対して親和性を示す表面になる材料を使用する。このような材料としては、銅材、ガラス球、鉄粉、これらを樹脂コートしたもの、磁性体と樹脂との混合物等を利用可能である。具体的には、基台100上で帯電している領域と逆極性の粉末材料207が静電引力で電荷206が存在している領域206に付着する。

【0078】定着工程(図12(d))： 定着工程は、基台100表面に付着した粉末材料207を定着させる工程である。上記静電引力により粉末材料207が基台100の帯電領域に付着したら、基台100に熱を加えて粉末材料207を融解させ基台100に定着させる。この結果、パターン形成領域10中に粉末材料が定着してなる親和性領域110が形成される。

【0079】上記したように本実施形態7では、基板を脱チャージして粉末材料を定着させることにより親和性領域および非親和性領域を備えた実施形態1の基板を製造できる。

【0080】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、非親和性を示す粉末材料による薄膜がパターン非形成領域11およびパタ

ーン形成領域10の非親和性領域111に残るように製造する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、親和性を示す粉末材料による薄膜がパターン形成領域10の親和性領域110に残されるように製造する。

【0081】(実施形態8)本発明の実施形態8は基台に印刷技術を用いて直接膜を形成していく製造方法に関する。図13に本実施形態8の基板の製造工程断面図を示す。図13は、例えば平板印刷の一種であるオフセット印刷を利用した場合の製造方法を説明するものである。

印刷工程(図13(a))：印刷工程は、所定の印刷方法により流動体に対し親和性を有する膜あるいは親和性のない薄膜を形成する工程である。印刷装置は基板のように硬い物質に印刷することが可能なものであることを要する。従来の印刷との違いは、インクの代わりに本発明の親和性領域または非親和性領域を形成する材料を用いる点である。基台100が極性分子を含む流動体に対し非親和性を示す場合には、この印刷装置によりパターン形成領域10中の親和性領域110のみに材料を付着させる。基台100が極性分子を含む流動体に対し親和性を示す場合には、この印刷装置によりパターン非形成領域11およびパターン形成領域10中の非親和性領域111に材料を付着させる。この図では、オフセット印刷装置のうち転写ローラ208のみを図示してある。転写ローラ208に付着した材料から基台100のパターン形成面に薄膜材料が転写される。印刷方法としては、オフセット印刷によらず、直接印刷法その他の平板印刷法、凸版、凹版、孔版、静電気や磁気を用いる方法等を適用することが可能である。すなわち、公知の印刷方法によりインクの代わりに薄膜材料を基台に付着させることが可能な印刷方法を適宜適用できる。

【0082】定着方法(図13(b))：薄膜材料が基台100に転写させられたら、熱処理等公知の技術を適用して薄膜材料を安定化させる。この工程により、パターン形成領域10の親和性領域110にのみ薄膜が形成された基板を製造できる。

【0083】上記したように本実施形態8によれば、公知の印刷法を利用して薄膜材料を付着させることによって実施形態1に示すような基板を製造することができる。

【0084】なお、基台100が流動体に対し親和性を示す材料で形成されている場合には、パターン非形成領域11およびパターン形成領域10の非親和性領域111に非親和性を示す薄膜を印刷する。基台100が流動体に対し非親和性を示す材料で形成されている場合には、パターン形成領域10の親和性領域110に親和性を示す薄膜を印刷する。

【0085】(その他の変形例)本発明は上記実施形態によらず種々に変形して適用することが可能である。例

えば、基台に形成するパターン形状や親和性領域の実施形態1で示した配置は単なる例示であり、種々に変更が可能である。点状パターン、線状パターンともその大きさ、形状および配置を種々に変更可能である。これらの要素は流動体の性質に対応して定まるものだからである。

【0086】また、基板を製造する方法は上記実施形態2から実施形態8のものに限定されず、パターン形成領域とパターン非形成領域とに分かれるものであれば、種々に変形することが可能である。

【0087】

【発明の効果】本発明によれば、流動体に対し親和性のある領域と親和性のない領域とを規則的に基板上に配置した構成を備えるので、一定面積のパターン形成領域に流動体を適量付着可能とする基板を提供することができる。

【0088】本発明によれば、流動体に対し親和性のある領域と親和性のない領域とを規則的に基板上に配置する工程を備えるので、一定面積のパターン形成領域に流動体を適量付着可能とする基板の製造方法を提供することができる。

【0089】したがって、従来、工場等において高価な設備により、多数の工程をかけて形成せざるを得なかった微細パターンが、容易にかつ安価に製造可能となる。

【図面の簡単な説明】

【図1】実施形態1の基板であり、(a)は平面図、(b)はその断面図である。

【図2】実施形態1の基板のパターン形成領域における親和性領域と非親和性領域の配置例であり、(a)は方形パターン、(b)はその変形例、(c)は円形パターン、(d)はその変形例、(e)は三角形パターン、(f)はその変形例、および(g)は線状パターンである。

【図3】パターン形成領域の形状の変形例を説明する基板平面図である。

【図4】実施形態1における基板の作用を説明する図である。(a)は点状パターンの場合、(b)は線状パターンの場合である。

【図5】通常の基板に液滴を吐出した場合の断面図であり、(a)は吐出直後、(b)は乾燥後である。

【図6】通常の基板に液滴を吐出した場合の平面図であり、(a)は吐出直後、(b)は乾燥後である。

【図7】(a)～(b)は、実施形態2の基板の製造方法である。

【図8】(a)～(c)は実施形態3の基板の製造方法である。

【図9】(a)～(c)は実施形態4の基板の製造方法である。

【図10】(a)～(c)は実施形態5の基板の製造方法である。

【図11】(a)～(d)は実施形態6の基板の製造方法である。

【図12】(a)～(d)は実施形態7の基板の製造方法である。

【図13】(a)～(b)は実施形態8の基板の製造方法である。

【符号の説明】

1、1a、1b、1c、1d、1e、1f、1g、1

h、1i…基板、

10…パターン形成領域

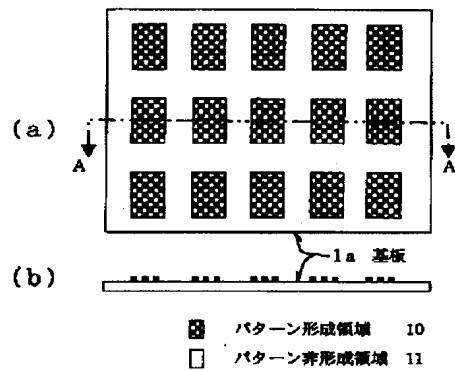
11…パターン非形成領域

110…親和性領域、

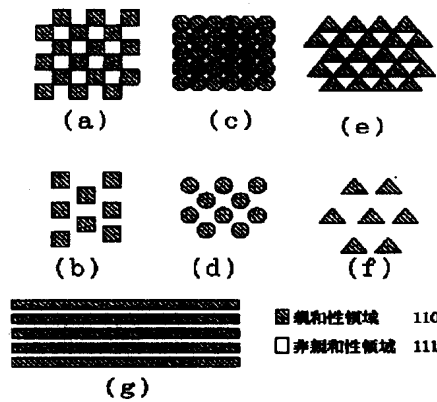
111…非親和性領域、

100…基台

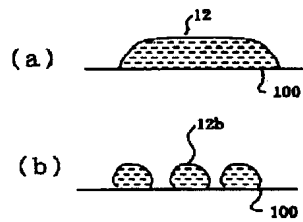
【図1】



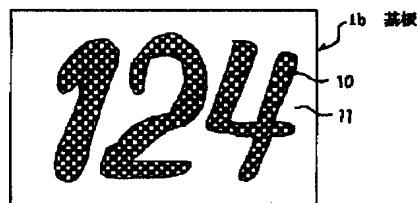
【図2】



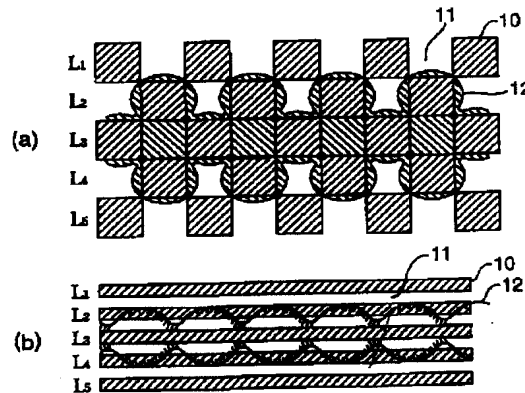
【図5】



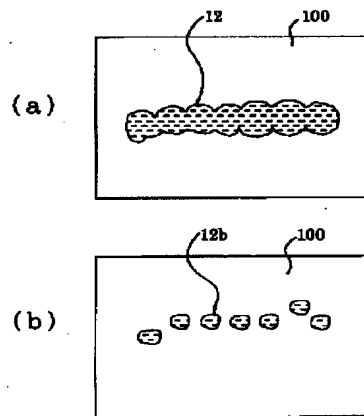
【図3】



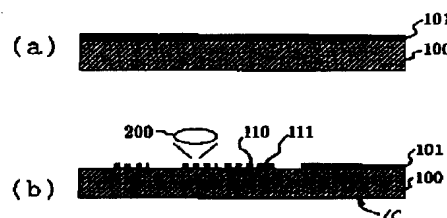
【図4】



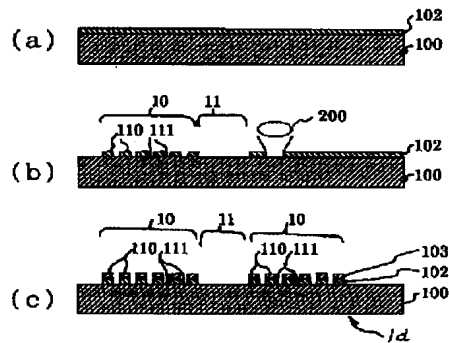
【図6】



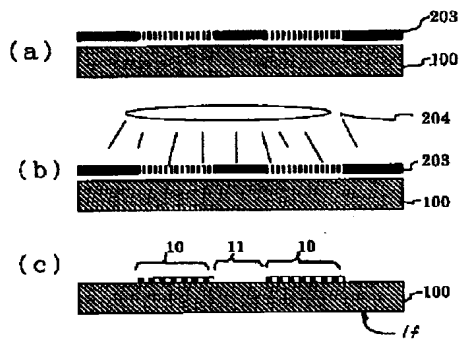
【図7】



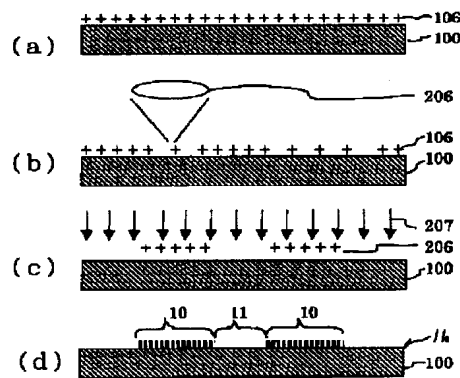
【図8】



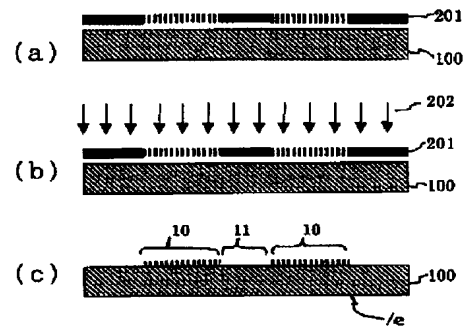
【図10】



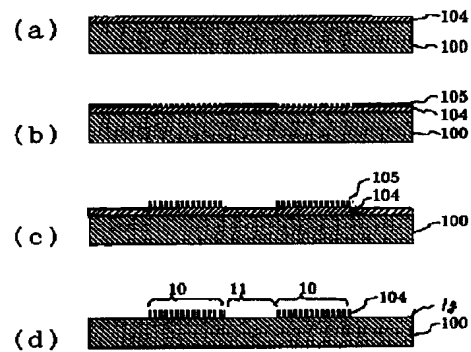
【図12】



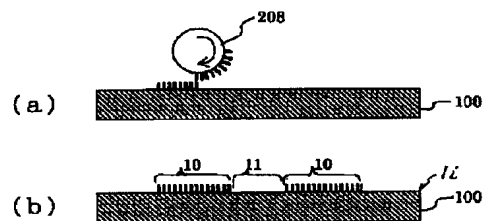
【図9】



【図11】



【図13】



【手続補正書】

【提出日】平成10年5月15日

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】図面の簡単な説明

【補正方法】変更

【補正内容】

【図面の簡単な説明】

【図1】実施形態1の基板であり、(a)は平面図、(b)はその断面図である。

【図2】実施形態1の基板のパターン形成領域における

親和性領域と非親和性領域の配置例であり、(a)は方形パターン、(b)はその変形例、(c)は円形パターン、(d)はその変形例、(e)は三角形パターン、(f)はその変形例、および(g)は線状パターンを示す図である。

【図3】パターン形成領域の形状の変形例を説明する基板平面図である。

【図4】実施形態1における基板の作用を説明する図である。(a)は点状パターンの場合、(b)は線状パターンの場合である。

【図5】通常の基板に液滴を吐出した場合の断面図であり、(a)は吐出直後、(b)は乾燥後である。

【図6】通常の基板に液滴を吐出した場合の平面図であり、(a)は吐出直後、(b)は乾燥後である。

【図7】(a)～(b)は、実施形態2の基板の製造方法を示す図である。

【図8】(a)～(c)は実施形態3の基板の製造方法を示す図である。

【図9】(a)～(c)は実施形態4の基板の製造方法を示す図である。

【図10】(a)～(c)は実施形態5の基板の製造方法を示す図である。

【図11】(a)～(d)は実施形態6の基板の製造方法を示す図である。

【図12】(a)～(d)は実施形態7の基板の製造方法を示す図である。

【図13】(a)～(b)は実施形態8の基板の製造方法を示す図である。

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